The PHOTOFACT® Servicer

SET 470 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ JAN., 1960

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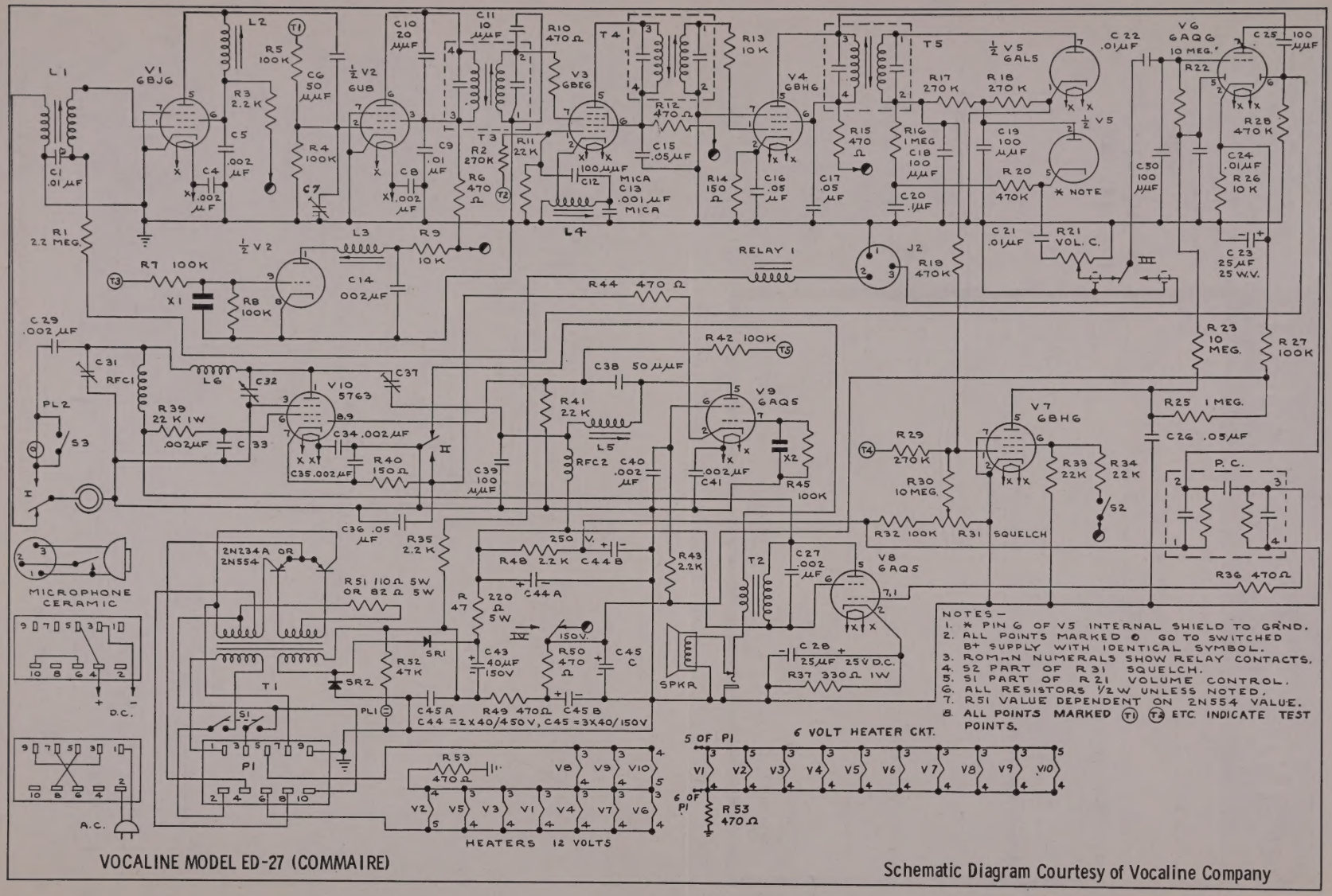
This Servicer provides you with essential data on other models or special equipment not covered in standard PHOTOFACT folders. The schematics and supplementary data included here will be of valuable help to you in servicing this equipment.

IN THIS ISSUE OF THE SERVICER:

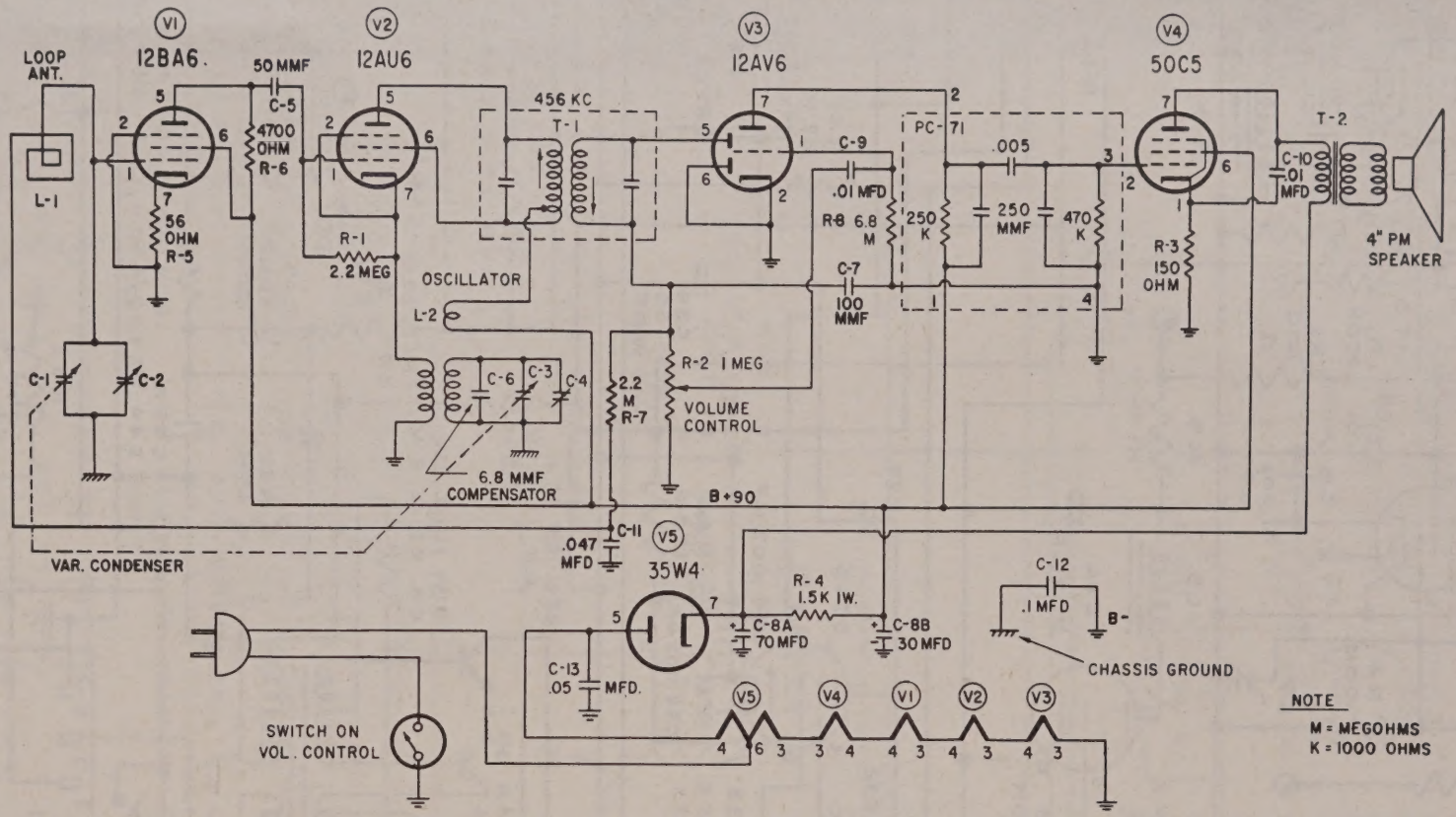
Olympic Model
543

Vocaline Model
ED-27 (Commaire)


V1 6BJ6
V2 6U8
V3 6BE6
V4 6BH6
V5 6AL5
V6 6AQ6
V7 6BH6
V8 6AQ5
V9 6AQ5
V10 5763
MICROPHONE CERAMIC
2N234A OR 2N554
SPKR
RELAY 1
6 VOLT HEATER CKT.
HEATERS 12 VOLTS
NOTES –
1. * PIN 6 OF V5 INTERNAL SHIELD TO GRND.
2. ALL POINTS MARKED ⊕ GO TO SWITCHED B+ SUPPLY WITH IDENTICAL SYMBOL.
3. ROMAN NUMERALS SHOW RELAY CONTACTS.
4. S2 PART OF R31 SQUELCH.
5. S1 PART OF R21 VOLUME CONTROL.
6. ALL RESISTORS 1/2W UNLESS NOTED.
7. R51 VALUE DEPENDENT ON 2N554 VALUE.
8. ALL POINTS MARKED (T1) (T2) ETC. INDICATE TEST POINTS.

VOCALINE MODEL ED-27 (COMMAIRE)

Schematic Diagram Courtesy of Vocaline Company

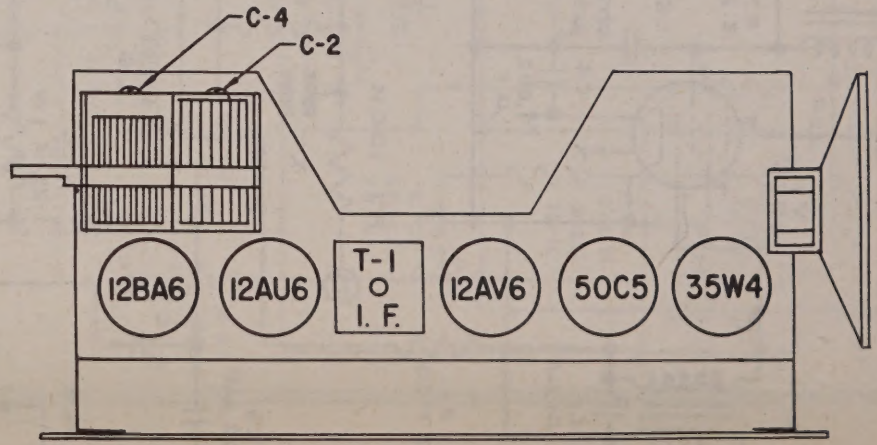


NOTE

M = MEGOHMS
K = 1000 OHMS

ALIGNMENT PROCEDURE CHART

STEP	CONNECT HIGH SIDE OF SIGNAL GENERATOR TO-	SET SIGNAL GENERATOR TO-	TURN RECEIVER DIAL TO-	ADJUST THE FOLLOWING FOR MAXIMUM OUTPUT. (KEEP SIGNAL FROM SIGNAL GENERATOR AS LOW AS POSSIBLE.)
1	ANTENNA SECTION TUNING CONDENSER IN SERIES WITH .1 MFD. COND.	455 KC.	FULL CLOCKWISE POSITION. (CONDENSER PLATES FULLY OPEN)	BOTTOM & TOP OF T-1 IN SAME ORDER (I.F. TRANSFORMER)
2		1650 KC.		C4 (OSCILLATOR TRIMMER)
3	USE RADIATED SIGNAL	1500 KC.	MAXIMUM SIGNAL APPROX. 1500 KC.	C2 (ANTENNA TRIMMER)
4		REPEAT STEPS 2 AND 3		



OLYMPIC MODEL 543

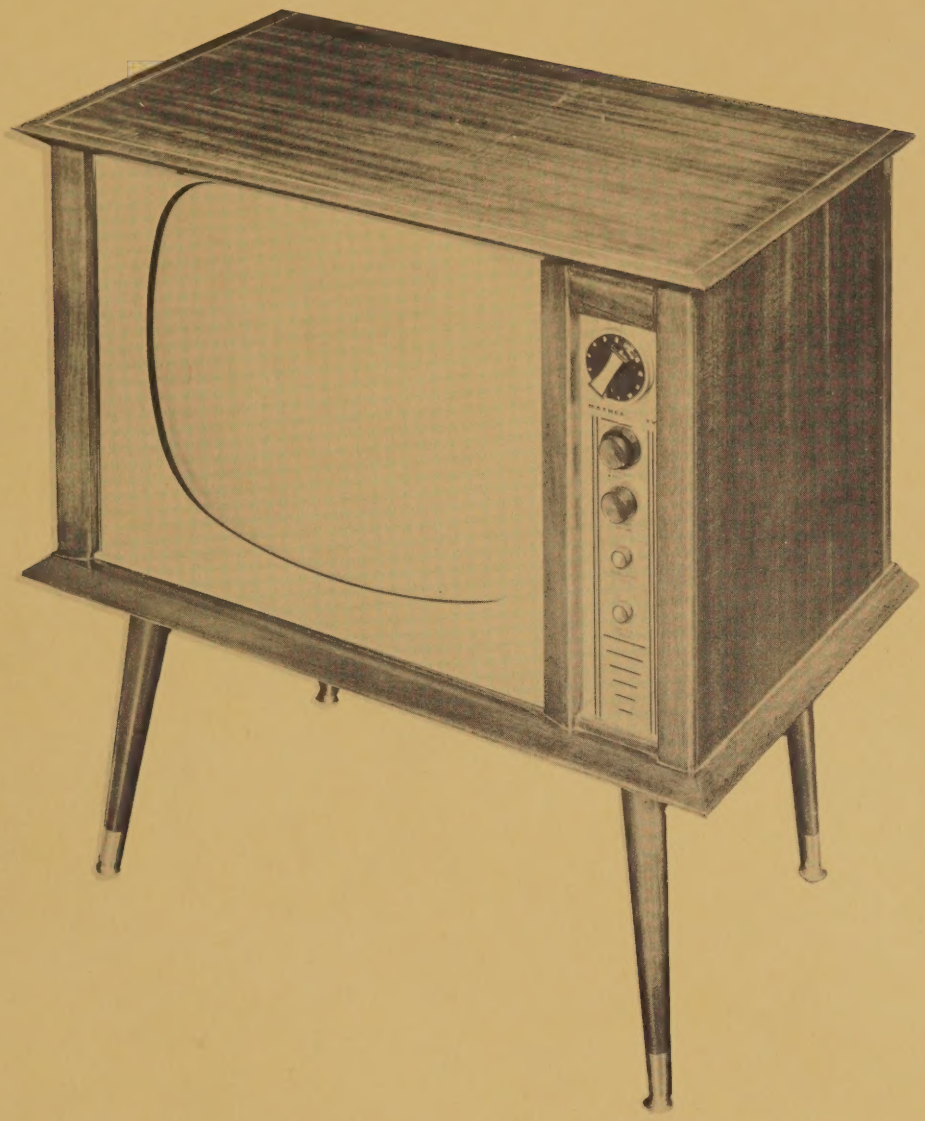
Schematic Diagram Courtesy of Olympic Radio & Television

PHOTOFACT® Folder with CIRCUITRACE*

EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

CURTIS MATHES MODELS 1121, 2121, 3121A, 5221A, 6221A, 8224

CURTIS MATHES MODELS 1121, 2121, 3121A, 5221A, 6221A, 8224



CURTIS MATHES MODELS 1121, 2121, 3121A, 5221A, 6221A, 8224

MODEL 1121

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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CURTIS MATHES MODELS 1121, 2121, 3121A, 5221A, 6221A, 8224

CURTIS MATHES MODELS 1121, 2121, 3121A, 5221A, 6221A, 8224

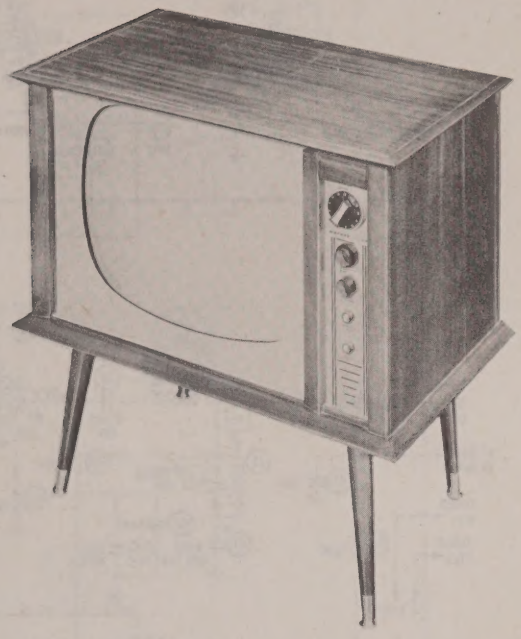
DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL MODEL 1121

1. Remove 9 wood screws holding rear cover. Remove the rear cover.
2. Remove speaker leads, HV lead, picture tube socket, yoke plug, antenna terminal board, and picture tube coating ground wire.
3. Remove 5 chassis bolts from bottom of cabinet.
4. Remove chassis.

PICTURE TUBE REMOVAL

1. Remove chassis.
2. Remove 4 wood screws holding picture tube mounting strap at top of cabinet.
3. Remove 3 bolts holding picture tube mount on bottom of cabinet.
4. Remove picture tube assembly.
5. Loosen picture mounting strap and remove picture tube.



MODEL 1121

TRADE NAME	Curtis Mathes MODELS 1121, 2121, 3121A, 5221A, 6221A, 8224
MANUFACTURER	Curtis Mathes Manufacturing Co., 2220 Young St., Dallas, Texas
TYPE SET	Television Receiver
TUBES	Eighteen
POWER SUPPLY	110-120 Volts AC, 60 Cycle RATING 180 Watts, 1.7 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

SERVICING IN THE FIELD

SAFETY GLASS REMOVAL

Remove 4 screws holding the trim strip at the top edge of the safety glass. Tilt glass out and remove.

FUSE

One fuse is used for low voltage power supply protection. (For location, see "Tube Placement Chart".)

TUNER OSCILLATOR ADJUSTMENTS

To touch-up the VHF Oscillator, remove Channel Selector and Fine Tuning knobs.

AGC

The AGC may be varied by means of a Range control. (For location, see "Tube Placement Chart".)

FOCUS

No provision is made to vary the focus on this receiver.

SYNC STABILITY

Sync stability may be varied by means of a Sync Stabilizer control. (For location, see "Tube Placement Chart".)

HORIZONTAL OSCILLATOR FIELD ADJUSTMENTS

Coarse adjustment of the Horizontal Hold is accomplished by the proper setting of the Horizontal Frequency slug. (For location, see "Tube Placement Chart".)

HORIZONTAL DRIVE

The horizontal drive may be varied by a Horizontal Drive trimmer. (For location, see "Tube Placement Chart".)

BUZZ ADJUSTMENT

To eliminate intercarrier buzz, adjust the Buzz control for MINIMUM buzz and maximum sound. (For location, see "Tube Placement Chart".)

CENTERING

Centering is accomplished by 2 magnetic rings, located behind the yoke, on the neck of the picture tube.

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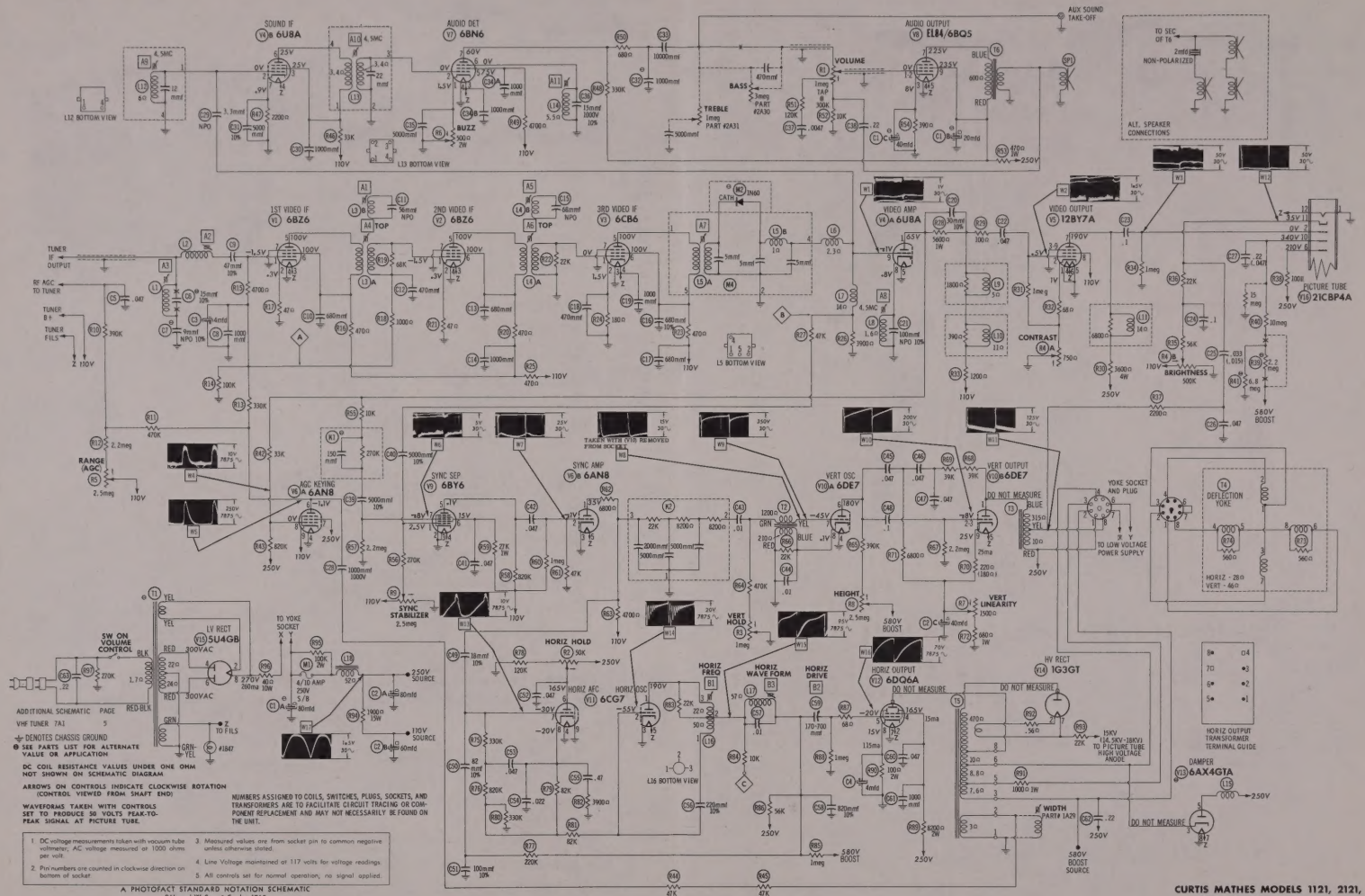
JA703

SET 470 FOLDER 1


SOUND IF V4 B 6U8A
AUDIO DET V7 6BN6
AUDIO OUTPUT V9 EL84/6BQ5
AUX SOUND TAKE-OFF
TO SEC OF T6
NON-POLARIZED
ALT. SPEAKER CONNECTIONS
VOLUME
BASS
TREBLE
1ST VIDEO IF V1 6BZ6
2ND VIDEO IF V2 6BZ6
3RD VIDEO IF V3 6CB6
VIDEO AMP V4 A 6U8A
VIDEO OUTPUT V5 12BY7A
PICTURE TUBE V16 21CBP4A
CONTRAST
BRIGHTNESS
580V BOOST
TUNER IF OUTPUT
RF AGC TO TUNER
TUNER B+
TUNER FILS
RANGE (AGC)
AGC KEYING V6 A 6AN8
SYNC SEP V9 6BY6
SYNC AMP V6 B 6AN8
SYNC STABILIZER
VERT OSC V10 A 6DE7
VERT OUTPUT V10 B 6DE7
DO NOT MEASURE
YOKE SOCKET AND PLUG
DEFLECTION YOKE
TO LOW VOLTAGE POWER SUPPLY
HORIZ - 28Ω
VERT - 46Ω
HEIGHT
VERT LINEARITY
VERT HOLD
HORIZ HOLD
HORIZ AFC V11 6CG7
HORIZ OSC
HORIZ FREQ
HORIZ WAVE FORM
HORIZ DRIVE
HORIZ OUTPUT V12 6DQ6A
HV RECT V14 1G3GT
HORIZ OUTPUT TRANSFORMER TERMINAL GUIDE
DAMPER V13 6AX4GTA
WIDTH PART# 1A29
SW ON VOLUME CONTROL
LV RECT V15 5U4GB
TO YOKE SOCKET
250V SOURCE
110V SOURCE
580V BOOST SOURCE
TO FILS
ADDITIONAL SCHEMATIC PAGE
VHF TUNER 7A1 5
DENOTES CHASSIS GROUND
SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM
ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)
WAVEFORMS TAKEN WITH CONTROLS SET TO PRODUCE 50 VOLTS PEAK-TO-PEAK SIGNAL AT PICTURE TUBE.
NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.
1. DC voltage measurements taken with vacuum tube voltmeter; AC voltage measured at 1000 ohms per volt.
2. Pin numbers are counted in clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line Voltage maintained at 117 volts for voltage readings.
5. All controls set for normal operation, no signal applied.
A PHOTOFACT STANDARD NOTATION SCHEMATIC
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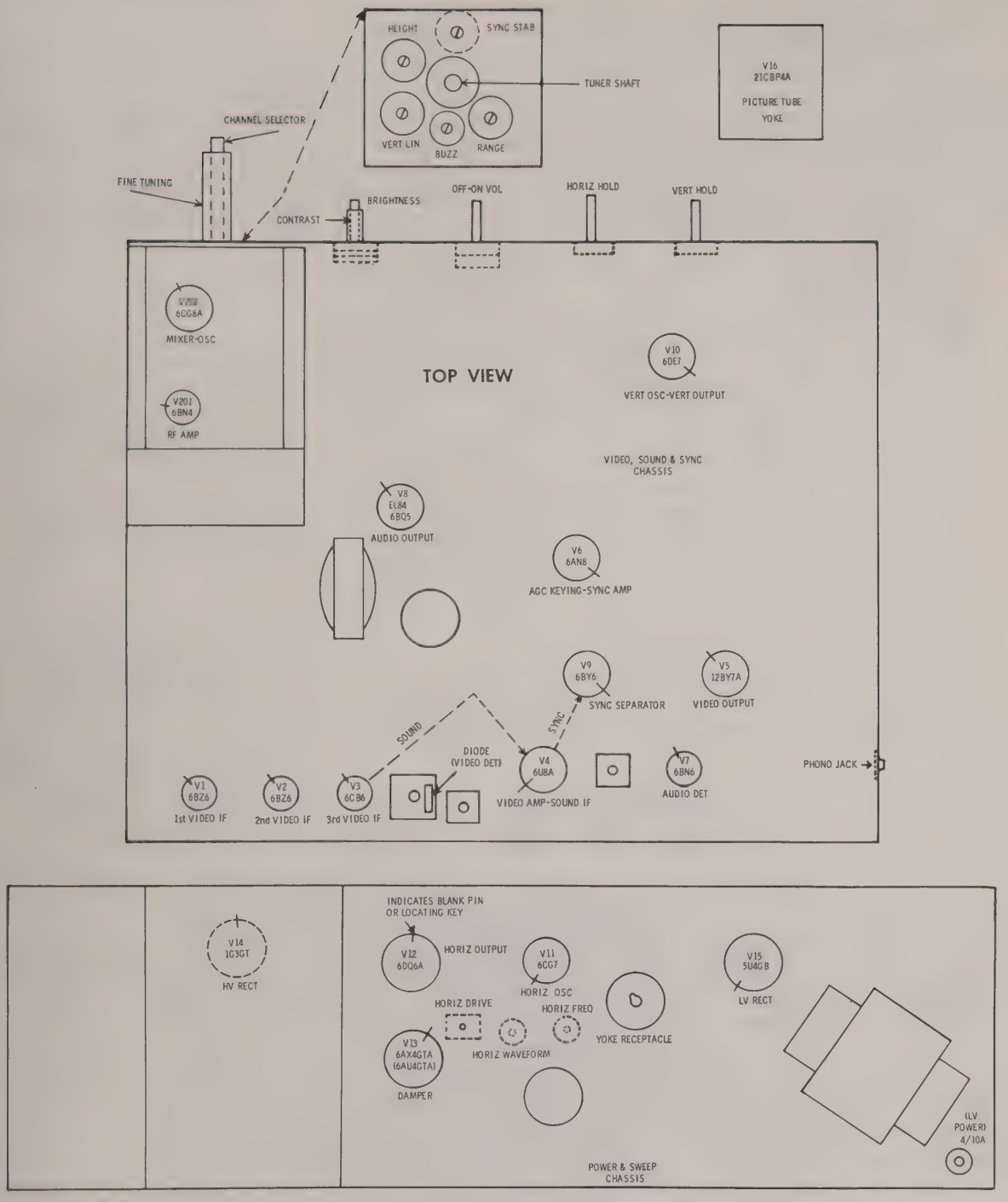
CURTIS MATHES MODELS 1121, 2121, 3121A, 5221A, 6221A, 8224

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound Fuse (LV Power), V15

SWEEP FAILURE
No raster, has sound V11, V12, V13, V14, V16
No vertical deflection V10
Poor vert. linearity or foldover V10
Poor horiz. linearity or foldover V11, V12, V13
Narrow picture V11, V12, V13, V15
Vert. off freq. V10
Horiz. off freq. V11

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster V1, V2, V3, Diode (Video Det.)
No pic, no sound, has snow V201, V202, V1
No pic, has sound, has raster V4, V5, V16
Has pic, no sound V4, V7, V8
Overloaded picture V6

SYNC FAILURE
No vert. sync V6, V9
No horiz. sync V6, V9
No vert. or horiz. sync V6, V9

ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS

The High Voltage lead should be securely taped and kept away from the chassis.
Allow a 20 minute warm-up period for the receiver and test equipment.
Suggested Alignment Tools: GENERAL CEMENT #8282, 8606, 8606L, 9295
WALSCO #2526, 2543, 2544, 2545

VIDEO IF ALIGNMENT

Connect the negative lead of a 1.5 volt bias supply to point Ⓐ. Positive to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide a usable pattern on scope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.		Place a thin insulated metal strip between the Mixer-Osc. tube (V202), and tube shield. Connect the high side of sweep generator to the metal strip. Low side to chassis.	44.0MC (10MC Swp)	47.25MC	Any non-interfering channel	Vert. Amp. thru demodulator probe (Fig. 1) to pin 5 (plate) of 2nd Video IF Amp. Low side to chassis.	A1	Adjust to place marker in trap notch as in Fig. 2.
2.		"	"	41.25MC 45.75MC 47.25MC	"	"	A2, A3	Adjust for response similar to Fig. 2. Mixer Plate Coil and A2 affect the shape of the top. A3 is adjusted to position 47.25MC marker. This adjustment must be made correctly or sound rejection will not be correct. The 45.75MC marker must be set exactly as shown or the overall response will not be correct.
3.		"	"	42.8MC	"	Vert. Amp. thru 10K to point Ⓑ. Low side to chassis. DC probe of VTVM thru 10K to point Ⓑ. Common to chassis. (Across Video Det. load)	A4	Increase bias at point A to -4.5 volts. Adjust sweep output for 2 volts DC at point Ⓑ. Adjust A4 for maximum amplitude at marker.
4.		"	"	41.25MC	"	"	A5	Adjust for MINIMUM amplitude at marker.
5.		"	"	45.3MC	"	"	A6	Adjust for maximum gain at marker.
6.		"	"	44.0MC	"	"	A7	"
7.		"	"	41.25MC 42.8MC 45.3MC 45.75MC 47.25MC	"	"		Check for response similar to Fig. 3 with markers as shown. If necessary, retouch A7 SLIGHTLY for symmetry of top, A6 to control, 45.75MC marker and A4 to control 42.8MC. Recheck position of trap frequency markers and if necessary, retouch appropriate coil slugs.

4.5MC TRAP ALIGNMENT

Use 0-10 volts AC scale on VTVM.
Set Contrast fully clockwise.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
8.	.005 mfd	High side to pin 9 (grid) of Video Amp. Low side to chassis.	4.5MC (Unmod)	Any non-interfering channel	RF probe to pin 11 (cathode) of picture tube. Common to chassis.	A8	Adjust for MINIMUM deflection.

SOUND IF ALIGNMENT

Tune in a TV signal and reduce signal level at antenna terminals, by using an attenuator or similar device until a hiss similar to super-regeneration is heard in the sound.
Adjust A9, A10 and A11 for maximum undistorted sound.
Adjust the Buzz control for MINIMUM buzz.

TUNER ALIGNMENT INSTRUCTIONS LOCATED ON PAGE 12

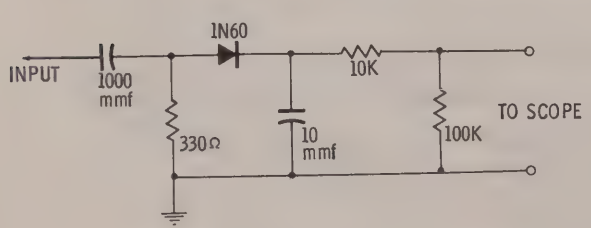


FIG. 1

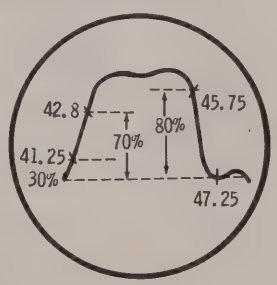


FIG. 2

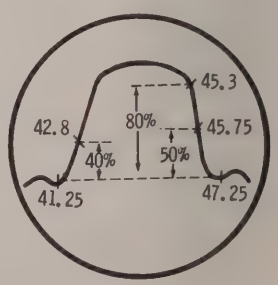
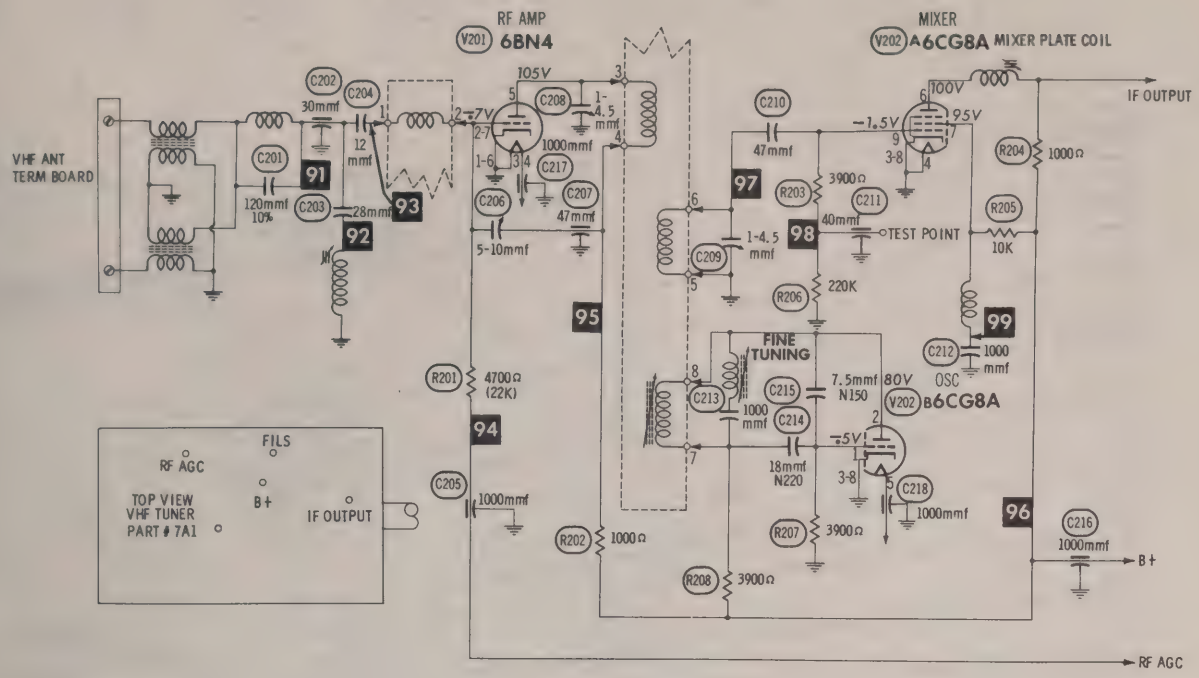


FIG. 3



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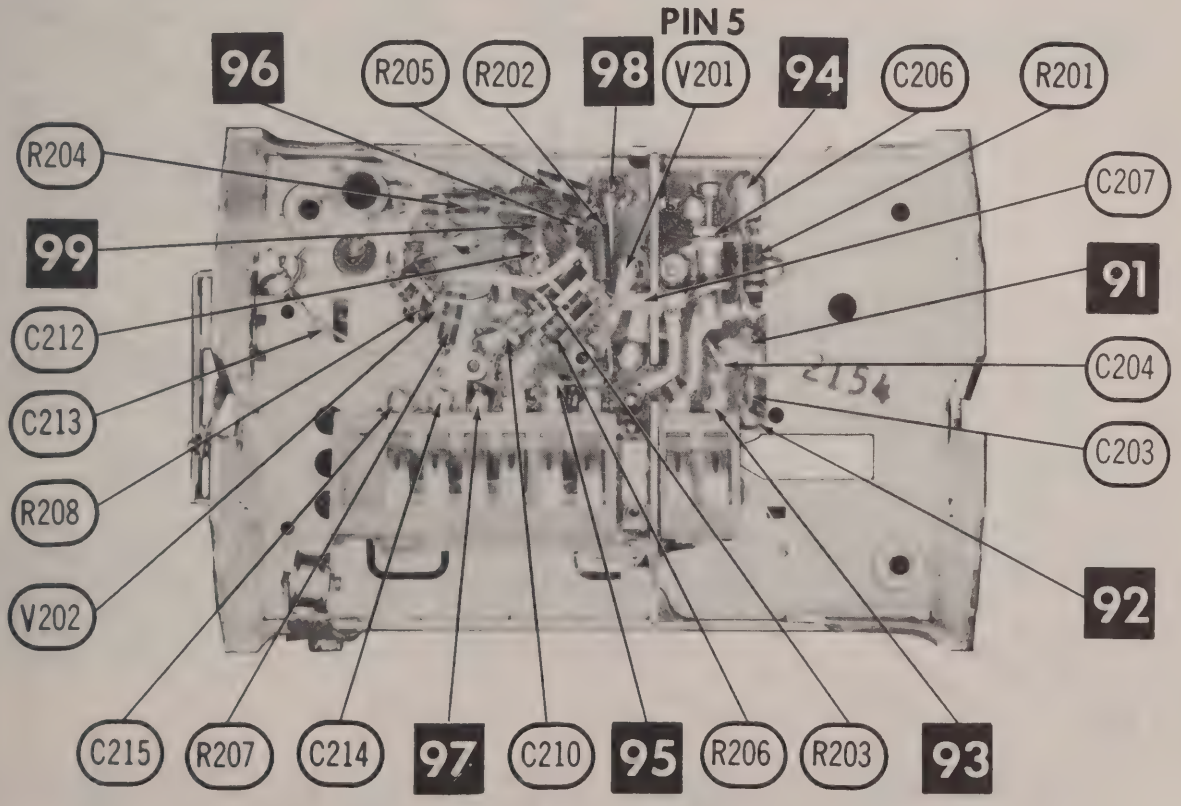
VHF TUNER 7A1



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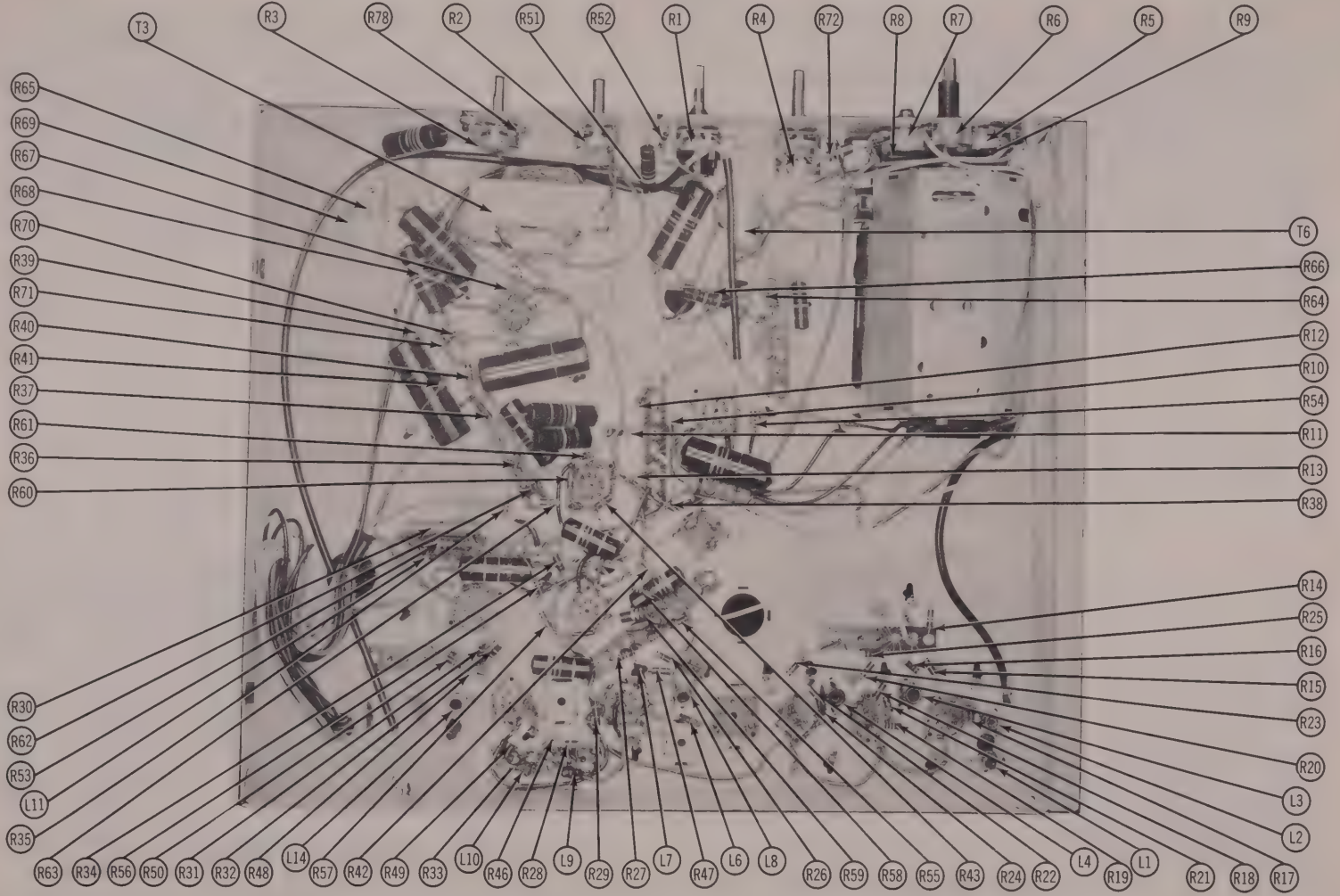
TUNER 7A1 BOTTOM VIEW

ARROWS INDICATING TUBE LOCATIONS ARE POINTING TO PIN 1 UNLESS OTHERWISE INDICATED

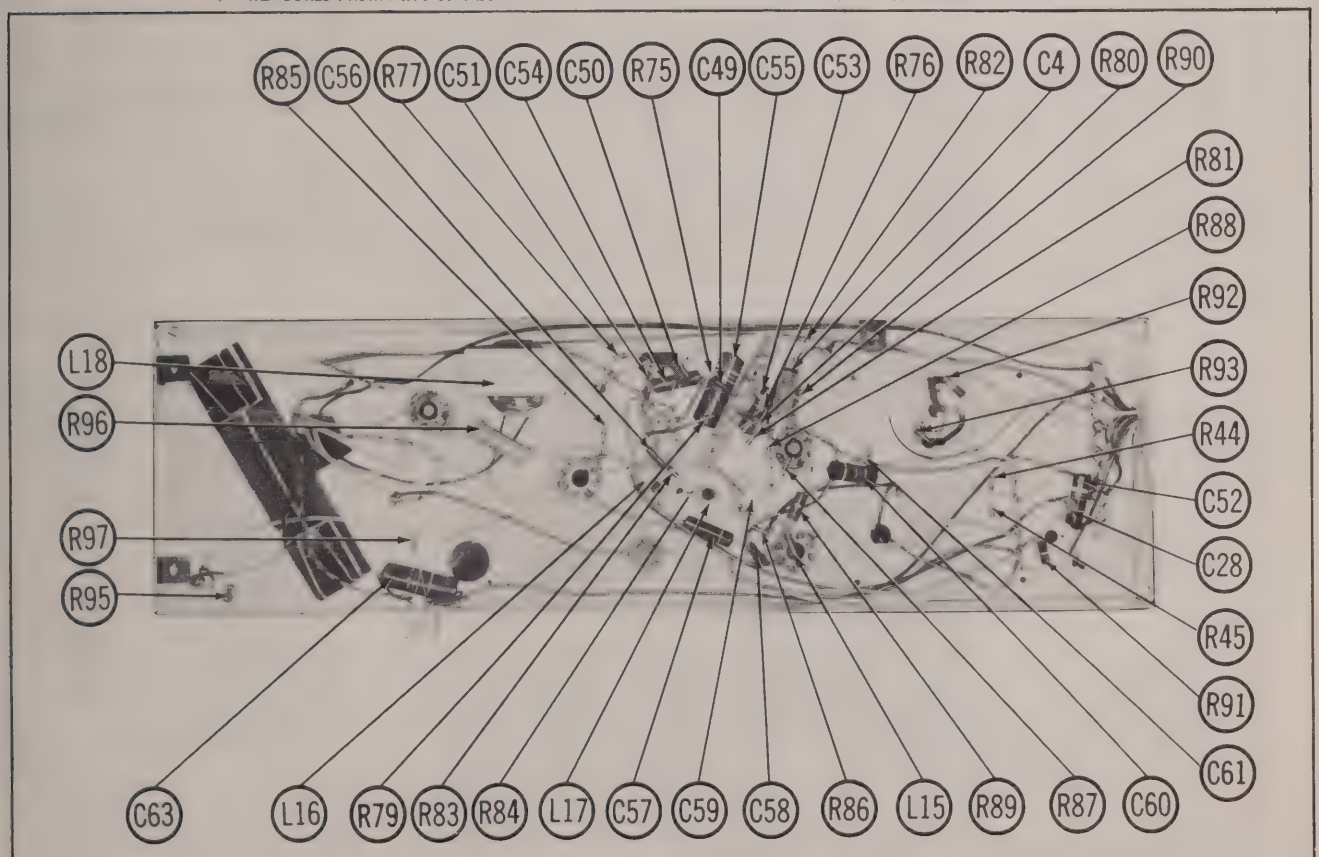


CHASSIS BOTTOM VIEW - RESISTOR & INDUCTOR IDENT.

RESISTANCE MEASUREMENTS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6BZ6	100K	47Ω	.1Ω	0Ω	†2800Ω	†2800Ω	0Ω		
V2	6BZ6	100K	47Ω	.1Ω	0Ω	†2800Ω	†2800Ω	0Ω		
V3	6CB6	.1Ω	180Ω	0Ω	.1Ω	†2400Ω	†2400Ω	0Ω		
V4	6U8A	†8700Ω	6Ω	†35K	.1Ω	0Ω	†35K	2200Ω	1.6Ω	3900Ω
V5	12BY7A	•150Ω	1meg	0Ω	0Ω	0Ω	.1Ω	†3600Ω	†1900Ω	0Ω
V6	6AN8	†13K	47K	0Ω	0Ω	.1Ω	430K	†0Ω	†40K	†1900Ω
V7	6BN6	•230Ω	3.4Ω	.1Ω	0Ω	†6600Ω	5.5Ω	†330K		
V8	EL84/ 6BQ5	10K	10K	390Ω	0Ω	.1Ω	NC	† 1100Ω	NC	†470Ω
V9	6BY6	•330K	0Ω	0Ω	.1Ω	†820K	†29K	2.2meg		
V10	6DE7	† 325Ω	2.2meg	2.2meg	0Ω	.1Ω	•†1.5meg	•1meg	22K	• 1000Ω
V11	6CG7	†56K	410K	0Ω	0Ω	.1Ω	•†25K	1.5meg	410K	0Ω
V12	6DQ6A	NC	.1Ω	NC	†8200Ω	1meg	NC	0Ω	100Ω	TOP CAP † 10Ω
V13	6AX4GTA	TP	NC	¶1meg	NC	†.1Ω	NC	.1Ω	0Ω	
V14	1G3GT		PINS	1 THRU 8	HAVE	INFINITE	RESISTANCE			TOP CAP †480Ω
V15	5U4GB	NC	¶	NC	22Ω	NC	24Ω	NC	¶	
V16	21CBP4A	0Ω	1meg	Pin 6 †100K	Pin 10 †12meg	Pin 11 •150K	Pin 12 .1Ω			
V201	6BN4	0Ω	800K	0Ω	.1Ω	†2900Ω	0Ω	800K		
V202	6CG8	3900Ω	†5800Ω	0Ω	0Ω	.1Ω	†2900Ω	†12K	0Ω	220K
ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
• THIS READING WILL VARY. CONTROL SET FOR NORMAL OPERATION.
† MEASURED FROM 250V SOURCE.
† MEASURED FROM PIN 3 OF V13.
NC NO CONNECTION.
TP TIE POINT.



POWER CHASSIS—BOTTOM VIEW

SET 470 FOLDER 1

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	CBS · GENERAL ELECTRIC · USE	TYPE	ITEM No.	RAYTHEON · SYLVANIA · USE	TYPE
V1	1st Video IF Amp.	6BZ6	V9	Sync Separator	6BY6
V2	2nd Video IF Amp.	6BZ6	V10	Vert. Osc. - Vert. Output	6DE7
V3	3rd Video IF Amp.	6CB6	V11	Horiz. AFC - Horiz. Osc.	6CG7
V4	Video Amp. - Sound IF Amp.	6U8A	V12	Horiz. Output	6DQ6A
V5	Video Output	12BY7A	V13	Damper	5AX4GTA (6AU4GTA)*
V6	AGC Keying-Sync Amp	6AN8	V14	HV Rect.	1G3GT
V7	Audio Det.	6BN6	V15	LV Rect.	5U4GB
V8	Audio Output	KL84/6BQ6			

* Alternate.

PICTURE TUBE

ITEM No.	REPLACEMENT DATA: Curtis Mathes PART No.	GENERAL ELECTRIC PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	NOTES
V16	21CBP4A	21CBP4A ①	21CBP4-A ①	21CBP4/ 21CBP4A	21CBP4/ 21CBP4A ②	① Aluminized. ② "Silver Screen 88"

ELECTROLYTIC CAPACITORS

ITEM No.	RATING: CAP	VOLT	REPLACEMENT DATA: Curtis Mathes PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	▲80	350	4A18	AFH3-39-75	C0237	FP378	TMT-43	TVLS-3541. 4*	Note 1
B	▲80	350							
C	▲40	50							
C2A	▲80	350	4A20	AFH3-39-50	C0237	FP378	TMT-43	TVLS-3541. 4*	
B	▲60	350							
C	2	50							
C3	4	50	4A19	PRH400	BBR4-50	TC350	TD-4-50	TVA-1402	
C4	4	50	4A19	PRH400	BBR4-50	TC350	TD-4-50	TVA-1402	

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.
Note 1. Some versions may use 80mfd ② 350V,30mfd ③ 350V, 20mfd ④ 50V in this application.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA: AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C5	.047 20OV		P288N-047	DD-503	CUB2B47	4DP-3-473	GEM-4147	2TM-947
C6	15 10%	Note 1	NPO-DE 15	DTZ-15	C10QS5C	CCTO-150	CNO-415	10TCC-Q15
C7	9 NPO 10%	Note 2	NPO-DE 10	DTZ-10	C10QLC	CCTO-100	CNO-410	10TCC-Q10
C8	1000		BPD-001	DD-103	BYA10D1	CCD-102	B-210	5SK-D10
C9	47 10%		DE-47	LK047	CCD-470	GP447	GP447	10TS-Q47
C10	680		BPD-00068	DD-681	BYA10T68	CCD-681	B-368	5GA-T68
C11	56 NPO		TCZ-56	DTZ-56	C10QS6C	CCTO-560	CNO-456	10TCC-Q56
C12	470		BPD-00047	DD-471	BYA10T47	CCD-471	B-347	5GA-T47
C13	680		BPD-00068	DD-681	BYA10T68	CCD-681	B-368	5GA-T68
C14	1000		BPD-001	DD-103	BYA10D1	CCD-102	B-210	5SK-D10
C15	68 NPO		NPO-DE 68	DTZ-68	C10QS8C	CCTO-680	CNO-468	10TCC-Q68
C16	680 10%		DE-680	DR5T68		CCD-681	GP368	10TS-T68
C17	680		BPD-00068	DD-681	BYA10T68	CCD-681	B-368	5GA-T68
C18	470		BPD-00047	DD-471	BYA10T47	CCD-471	B-347	5GA-T47
C19	1000		BPD-001	DD-103	BYA10D1	CCD-102	B-210	5SK-D10
C20	30 10%		DE-30	DD-300	C10QS3C	CCD-300	GP430	10TS-Q30
C21	100 NPO 10%		NPO-DL 100	DTZ-100	C10TLC	CCTO-101	CNO-310	10TCC-T10
C22	.047 400V		P488N-047	DD-503	CUB4B47	4DP-3-473	GEM-4147	4TM-947
C23	.1 400V		P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P1
C24	.1 200V		P288N-1	DF-104	CUB2P1	2DP-3-104	GEM-201	2TM-P1
C25	.033 600V	(.015)*	P688N-033	DD-333	CUB6S33	6DP-3-333	GEM-6133	6TM-S33
C26	.047 800V		P888N-047	DD-503	CUB8S47	8DP-3-473	GEM-8147	8TM-947
C27	.22 800V	(.047)*	P888N-22		CUB8P23	8DP-5-224	GEM-8023	8TM-P23
C28	1000 1000V		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5SK-D10
C29	9.3 NPO		NPO-DI 3.3	DTZ-3R3	C10V33C	CCTO-3R3	CNO-533	10TCC-V33
C30	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5SK-D10
C31	5000 10%		DE-5000		PM5D5	CCP-502	JL-250	10TS-D50
C32	1000	Note 3.	BPD-001	DD-102	BYA10D1	CCD-102	B-210	5SK-D10
C33	10000		BPD-001	DD-103	BYA10S1	CCD-103	B-110	5SK-S10
C34A	1000		BPD-1X001	DD8-102	BYD8D1	CCD-102	B2X100	5SK-X100
B	1000					CCD-102		
C35	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5SK-D50
C36	15 1000V 10%		DE-15	DD-150	L10T15	CCD-150	GP415	10TS-Q15
C37	.0047 200V		P288N-0047	DE-472	CUB2D47	2DP-1-472	GEM-6347	6TM-D47
C38	.22 200V		P288N-22		CUB2P22	2DP-4-224	GEM-2023	2TM-P22
C39	5000 10%		DE-5000		PM5D5	CCP-502	JL-250	10TS-D50
C40	5000 10%		DE-5000		PM5D5	CCP-502	JL-250	10TS-D50
C41	.047 400V		P488N-047	DD-503	CUB4B47	4DP-3-473	GEM-4147	4TM-947
C42	.047 400V		P488N-047	DD-503	CUB4B47	4DP-3-473	GEM-4147	4TM-947
C43	.01 400V		P488N-01	DE-103	CUB4S1	4DP-1-103	GEM-401	4TM-S1
C44	.01 400V		P488N-01	DE-103	CUB4S1	4DP-1-103	GEM-401	4TM-S1
C45	.047 800V		P888N-047	DD-503	CUB8S47	8DP-3-473	GEM-8147	8TM-947
C46	.047 800V		P888N-047	DD-503	CUB8S47	8DP-3-473	GEM-8147	8TM-947
C47	.047 600V		P688N-047	DD-503	CUB6S47	6DP-3-473	GEM-6147	6TM-947
C48	.1 800V		P688N-1	DF-104	CUB6P1	6DP-4-104	GEM-601	6TM-P1
C49	18 10%		1469-00018	TCZ-18	22R5Q18	CM-20B-180K		MS-418
C50	33 10%		1469-00033	TCZ-33	22R5Q33	CM-20B-330K		MS-433
C51	100 10%		1469-0001	TCZ-100	22R5T1	CM-20B-101K	MCS235	MS-310
C52	.047 400V		P488N-047	DD-503	CUB4B47	4DP-3-473	GEM-4147	4TM-947
C53	.047 300V		P488N-047	DD-503	CUB2S47	4DP-3-473	GEM-4147	4TM-947
C54	.022 200V		P288N-022	DD-203	CUB2S22	4DP-3-333	GEM-4122	2TM-S23
C55	.47 200V		P288N-47		CUB2P47	2DP-5-474	GEM-2047	2TM-P47
C56	220 10%		1469-00022	TCZ-220	22R5T22	CM-20B-221K	MCS237	MS-322
C57	.01 400V		P488N-01	DE-103	CUB4S1	4DP-1-103	GEM-401	4TM-S1
C58	820 10%		1469-00082	DD-821	1R5T83	CM-30B-821K 469	MCS251	MS-382
C59	170-700							
C60	.047 400V		P488N-047	DD-503	CUB4S47	4DP-3-473	GEM-4147	4TM-947
C61	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5SK-D10
C62	.22 800V		P888N-22		CUB8P22	8DP-5-224	GEM-8022	8TM-P22
C63	.22 400V		P488N-22		CUB4P22	4DP-5-224	GEM-4022	4TM-P22

Note 1. Not used in some versions.
Note 2. Some versions may use 47mmf.
Note 3. Some versions may use 470mmf or 100mmf.
* Alternate value.

CONTROLS

ITEM No.	RATING: RESISTANCE	WATTS	REPLACEMENT DATA: Curtis Mathes PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1meg	½	2A39				FP187S	Volume
	300K Tap							
B	Shaft						D8-37	
C	Switch						Not Req.	Push-Push Off-On
R2A	50K	½	2A32	A2-31	A47-50K-8	Q11-153	U35	Horiz. Hold
B	Shaft			A2-8	RS-3/16	NQ	U8-37	
R3A	1meg	½	2A23	A2-29	A47-1meg-S	Q11-157	U34	Vert. Hold
B	Shaft			A2-8	RS-3/16	NQ	D8-37	
R4A	750Ω	½	2A33	F1-3		▪ (U)-1134	▪ (U)6073	Contrast Brightness Range (AGC)
B	500K			R2-40				
R5A	2.5meg	½	2A35	A2-33	B47-2.5meg-S	B11-329	SU-565	
B	Shaft			AK-1	Not Req.	TM4	Not Req.	
R6	500Ω	2(WW)	2A11	WW-501	2S-500	U2-500	FL500	Buzz
R7A	1500Ω	½	2A38	A2-5	A47-1500-S	B11-109	SU-5	Vert. Lin.
B	Shaft			AK-1	FKS-1/4	TM1	Not Req.	
R8A	2.5meg	½	2A36	A2-33	B47-2.5meg-S	B11-329	SU-565	Height
B	Shaft			AK-1	Not Req.	TM4	Not Req.	
R9A	2.5meg	½	2A32	A2-33	B47-2.5meg-S	B11-329	SU-565	Sync Stabilizer
B	Shaft			AK-1	Not Req.	TM4	Not Req.	

† "Concentrikit" Equivalent: K-15 Kit With Base Elements & Shafts: Bil-106, P17-038 (Panel) Bil-123, Rl-105 (Rear)

▪ "STA-LOC" Equivalent: FA76IL, RU58L, OF8IL, IR187.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS	ITEM No.	RATING	REMARKS	ITEM No.	RATING	REMARKS
R10	390K		R40	10meg		R70	220Ω	(180Ω)*
R11	470K		R41	6.8meg	Note 1	R71	5800Ω	
R12	2.2meg		R42	33K		R72	6800 1W	
R13	330K		R43	820K		R73	560Ω	
R14	100K		R44	47K		R74	560Ω	
R15	4700Ω		R45	47K		R75	330K	
R16	470Ω		R46	33K		R76	820K	
R17	47Ω		R47	2200Ω		R77	220K	
R18	10000Ω		R48	330K		R78	120K	
R19	68K		R49	4700Ω		R79	82K	
R20	470Ω		R50	8800Ω		R80	330K	
R21	47Ω		R51	130K		R81	82K	
R22	22K		R52	10K		R82	1900Ω	
R23	470Ω		R53	470Ω 1W		R83	22K	
R24	180Ω		R54	390Ω		R84	10K	
R25	470Ω		R55	15K		R85	1meg	
R26	3900Ω		R56	270K		R86	56K	
R27	47K		R57	2.2meg		R87	68Ω	
R28	5800Ω 1W		R58	820K		R88	1meg	
R29	100Ω		R59	27K 1W		R89	6200Ω 2W	
R30	3900Ω 4W		R60	39K		R90	100Ω 3W	
R31	1meg		R61	47K		R91	1000Ω 1W	
R32	68Ω		R62	6800Ω		R92	56Ω	
R33	1200Ω		R63	4700Ω		R93	22K	
R34	1meg		R64	470K		R94	1900Ω 15W	▪6A17
R35	56K		R65	390K		R95	100K 2W	
R36	22K		R66	22K		R96	40Ω 10W	
R37	2200Ω		R67	2.2meg		R97	270K	
R38	100K		R68	68K				
R39	2.2meg	Note 1	R69	39K				

* Alternate value. # Curtis Mathes Part Number. Note 1. Not used in some versions.

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	Curtis Mathes PART No.	REPLACEMENT DATA	
K1	Sync Sep. Grid	150mmf, 270K		*	
K2	Vert. Integrator	2000mmf, 5000mmf, 5000mmf, 820Ω, 820Ω, 22K		Aerovox	PA-501
				Centralab	PC-104
				Cornell-Dubilier	UZ7M1
				Sprague	V1/V3
				Mallory	MS-100

* Some versions may use Component Combination (330mmf, 150K) in this application.

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA: Curtis Mathes PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	NOTES
L1	47.25MC Trap	LA12	17-4538 *	17-4538 *	TV-153 *			
L2	1st Video IF	LA13	17-4539 *	17-4539 *				
L3A	2nd Video IF	LA14						
B	47.25MC Trap							
L4A	3rd Video IF	LA15						
B	41.25MC Trap							
L5A	4th Video IF	†						† Part of M4
B	RF Choke							
L6	Resonant Choke	LA36						30uh
L7	Shunt Peaking Coil	14A1	19-3180	19-3180	TV-184	6180	VP-5	180uh
L8	4.5MC Trap	1A17	20-1004	20-1004		1670	SF-3	
L9	Shunt Peaking Coil	14A3						30uh ①
L10	Shunt Peaking Coil	14A2	19-3100 a	19-3100 a	TV-194 a	6112 a	VP-3 a	100uh ②
L11	Shunt Peaking Coil	14A4	19-3180 a	19-3180 a	TV-184 a	6180 a	VP-5 a	180uh ③
L12	1st Sound IF	1A18						
L13	2nd Sound IF	1A19	17-3495	17-3495	TV-113	5303	SF-2	
L14	Quadrature Coil	1A30	20-1005	20-1005	TV-121	1480		
L15	RF Choke	LA23	19-1001	19-1001	BC-563	4604		1.9ub

* Disregard tap.
a Parallel with 390Ω resistor.
▪ Parallel with 6800Ω resistor.
① Wound on 1500Ω resistor.
② Wound on 390Ω resistor.
③ Wound on 6800Ω resistor.

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES.: PRI.	SEC.	REPLACEMENT DATA: Curtis Mathes PART No.	Halldorson PART No.	Merit PART No.	Miller PART No.	Ram PART No.	Thordarson PART No.	NOTES
L16	72Ω		1A21	HS-7	TV-165	6212		HS-7	Horiz. Osc. tap@ 50Ω
L17	57Ω		1A22	HS-8		6314		HS-8	Horiz. Waveform

FILTER CHOKE

ITEM No.	RATINGS: CURRENT (Measured)	DC RES.	INDUCTANCE @ CURRENT (000 'U)	REPLACEMENT DATA: Curtis Mathes PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L18	.260A	52Ω	1.5 Hy.	10A12	26C44				26C44	C-23X

TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	SEC. 1	SEC. 2	REPLACEMENT DATA: Curtis Mathes PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V ④ 1.7A	660VCT ① ②. 280A	5V ④ 3A	12A8-1 ①						
	SEC. 3	SEC. 4	SEC. 5							
	6.3V ④ 8.7A									

① Horizontal Chassis uses Part #12A8-2.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA: Curtis Mathes PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Rogers PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T2	Vert. Osc.	10A11	28A05	A-3006	V408	VBO19	VBO-301	28A05	A-132X
T3	Vert. Output	10A14	26873	A-3864	V301 ①	VO34 ①	A-8164 ①	26873	A-118X ②
T4	Yoke-Horiz. (20MH)	1A30-1	Y-16	MDF-92	Y90F19/43	PCM2043	DY-16A	Y-18	Y-4U
	(80°-Vert. (40MH)		③④	③④⑤	③④	①④⑤	③④	④	④
T5	Horiz. Output	1A27					③④⑤	④	D10S*

① Connect as autoformer.
② Cut and tape red-black lead.
③ Use original rear cover and centering device.
④ Connect yoke terminal #3 to yoke plug pin #4, yoke #2 and #7 to plug #3, yoke #1 to plug #2.
⑤ Removes horizontal damping network from yoke.

Original Connections:

	8	6	5	3	1	7
* Triad	DP	B	S	S	A+	A-

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI.	SEC.	REPLACEMENT DATA: Curtis Mathes PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T6	5200Ω	6-8Ω	10A10	24B92	A-3902 ①	AU-609	A-2313	24B92	S-55X	① Drill new mounting hole.

SPEAKER

ITEM No.	TYPE: SIZE	FIELD	V. C. IMP.	REPLACEMENT DATA: Curtis Mathes PART No.	QUAM PART No.	NOTES
SP1	8"	PM	8-10Ω		8AL2S.4.	

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA: Curtis Mathes PART No. FUSE	HOLDER	LITTELFUSE PART No. FUSE	HOLDER	BUSS PART No. FUSE	HOLDER
M1	N	4/10A 250V 8/3			333.400 (N 4/10A 250V 8/B)	348000	N 4/10	HN 3/10 to 1/2

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA: Curtis Mathes PART No.	CBS PART No.	RAYTHEON PART No.	SYLVANIA PART No.	NOTES
M2	1N60 *	†	1N60	1N60	1N60	Detector (Pigtail)

† Part of M4. * Alternate CK706A.

MISCELLANEOUS

ITEM No.	PART NAME	Curtis Mathes PART No.	NOTES
M3	Tuner	7A1	VHF
M4	4th Video IF Assy.	1A16	

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Safety Glass	12B1	
Knob	11B8-1	Channel Selector
Knob	11B3	Fine Tuning
Knob	11B3-1	Volume, Tone
Knob	11B7-1	Brightness
Knob	11B6-1	Contrast

WIRING DATA

High Voltage Lead	Use BELDEN No. 8869
Shielded Hook-up Wire	Use BELDEN No. 8685 (Single Conductor) 8738 (Two Conductor)
General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord (Interlock Type)	Use BELDEN No. 8874
300Ω Tuner Input Lead	Use BELDEN No. 8225
300Ω Antenna Lead-in	Use BELDEN No. 8230 or 8276
Antenna Rotor Cable	Use BELDEN No. 8464 (Flat) or 8484 (Round) - 4 Conductor 8485 (Round) - 5 Conductor 8488 (Round) - 8 Conductor

CURTIS MATHES MODELS 1121, 2121, 3121A, 5221A, 6221A, 8224

FOLDER 1

TUNER PARTS LIST AND DESCRIPTIONS

7A1

TUBES

◆ CBS ◆ GENERAL ELECTRIC ◆ RAYTHEON ◆ SYLVANIA ◆

ITEM No.	USE	TYPE
V201	RF Amplifier	6BN4

ITEM No.	USE	TYPE
V202	Mixer-Osc.	6CG8A

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C201	120 10%		DI-120	DTZ-120	L10T12	CCD-121	CNO-312	10TCC-T12
C202	30							
C203	28		DI-27	TCZ-27	C10Q27C	CCTO-270	CNO-427	10TCC-Q27
C204	12		DI-12	TCZ-12	C10Q12C	CCTO-120	CNO-412	10TCC-Q12
C205	1000		EF-001	MFT-1000		CCF-102	CT280A	
C206	5-10			829-10				
C207	47							
C208	1-4.5			829-6				
C209	1-4.5			829-6				
C210	47		DI-47	DD-470	L10Q47	CCD-470	CNO-447	10TCC-Q47
C211	40							
C212	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C213	1000		DI-1000	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C214	18 N220					*		10TCR-Q18
C215	7.5 N150					*		
C216	1000		EF-001	MFT-1000		CCF-102	CT280A	
C217	1000		EF-001	MFT-1000		CCF-102	CT280A	
C218	1000		EF-001	MFT-1000		CCF-102	CT280A	

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R201	4700Ω	(22K) *
R202	1000Ω	
R203	3900Ω	

* Alternate value.

ITEM No.	RATING	REMARKS
R204	1000Ω	
R205	10K	
R206	220K	

ITEM No.	RATING	REMARKS
R207	3900Ω	
R208	3900Ω	

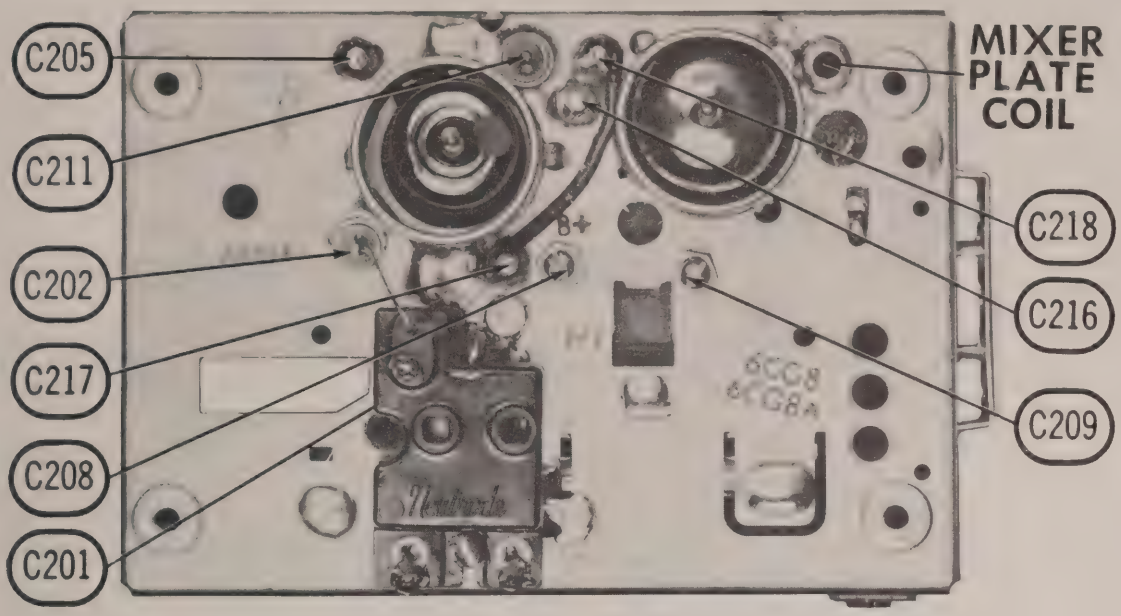
TUNER ALIGNMENT INSTRUCTIONS

VHF OSCILLATOR ALIGNMENT

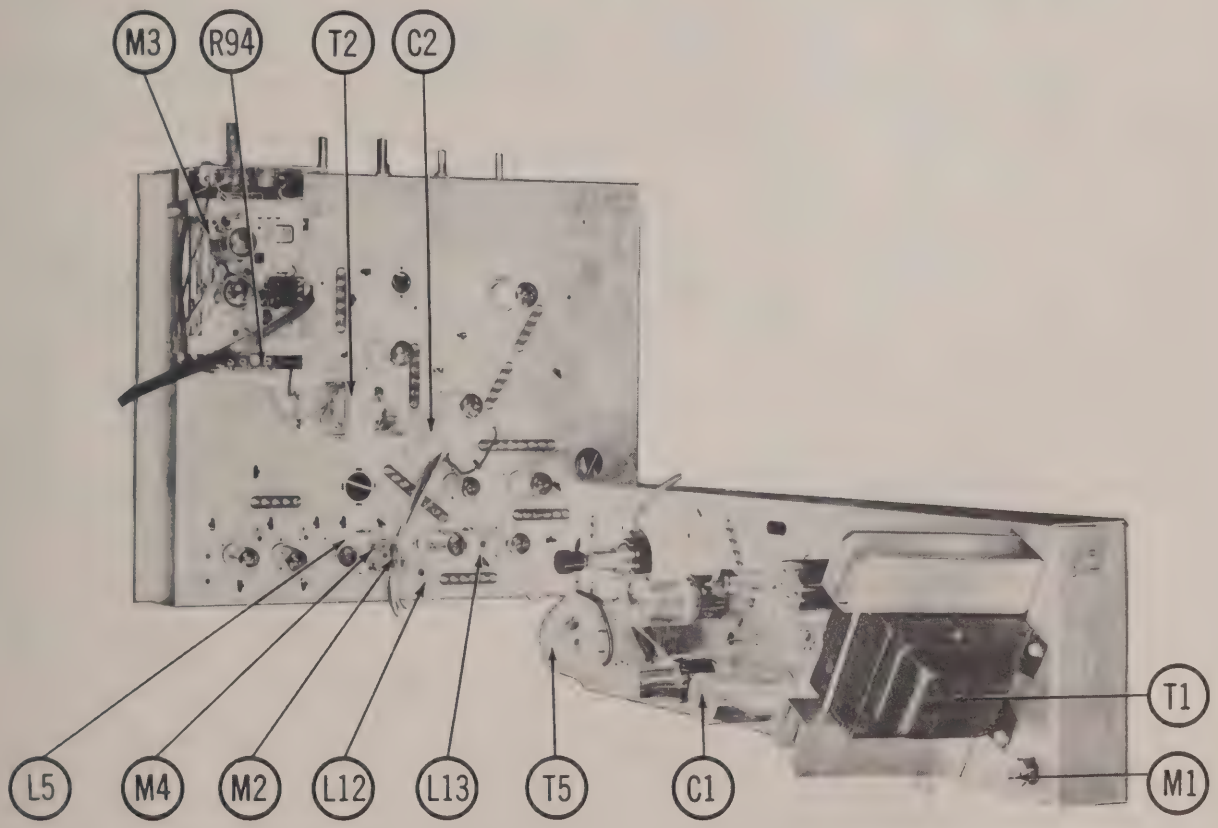
The individual channel adjustment screws are accessible one at a time, thru a hole in the front of the tuner, as the Channel Selector is rotated. Set the Fine Tuning to the center of its range and switch to channel to be adjusted. Adjust for best picture and sound.

VHF RF AND MIXER ALIGNMENT

This portion of the tuner has been properly aligned at the factory and is very stable. Alignment of this portion should not be attempted in the field.

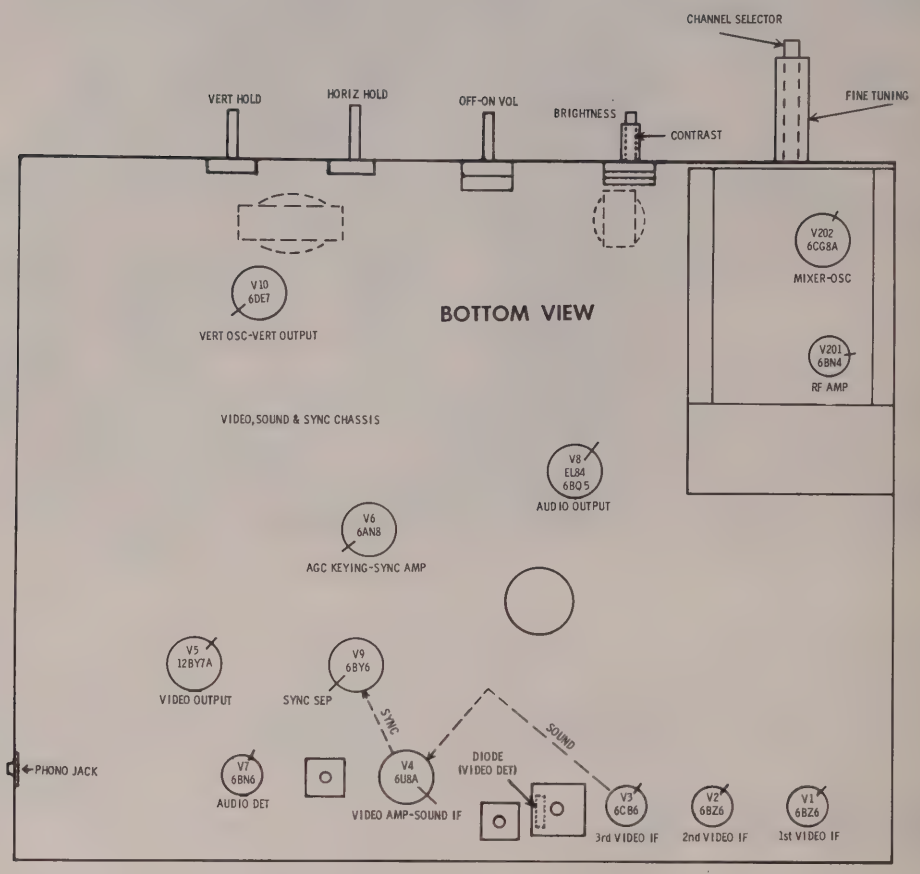


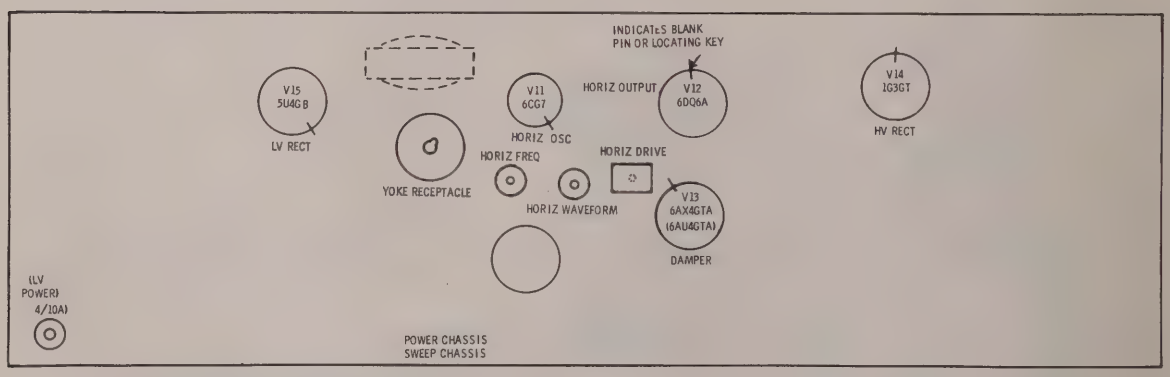
TUNER 7A1 - TOP VIEW

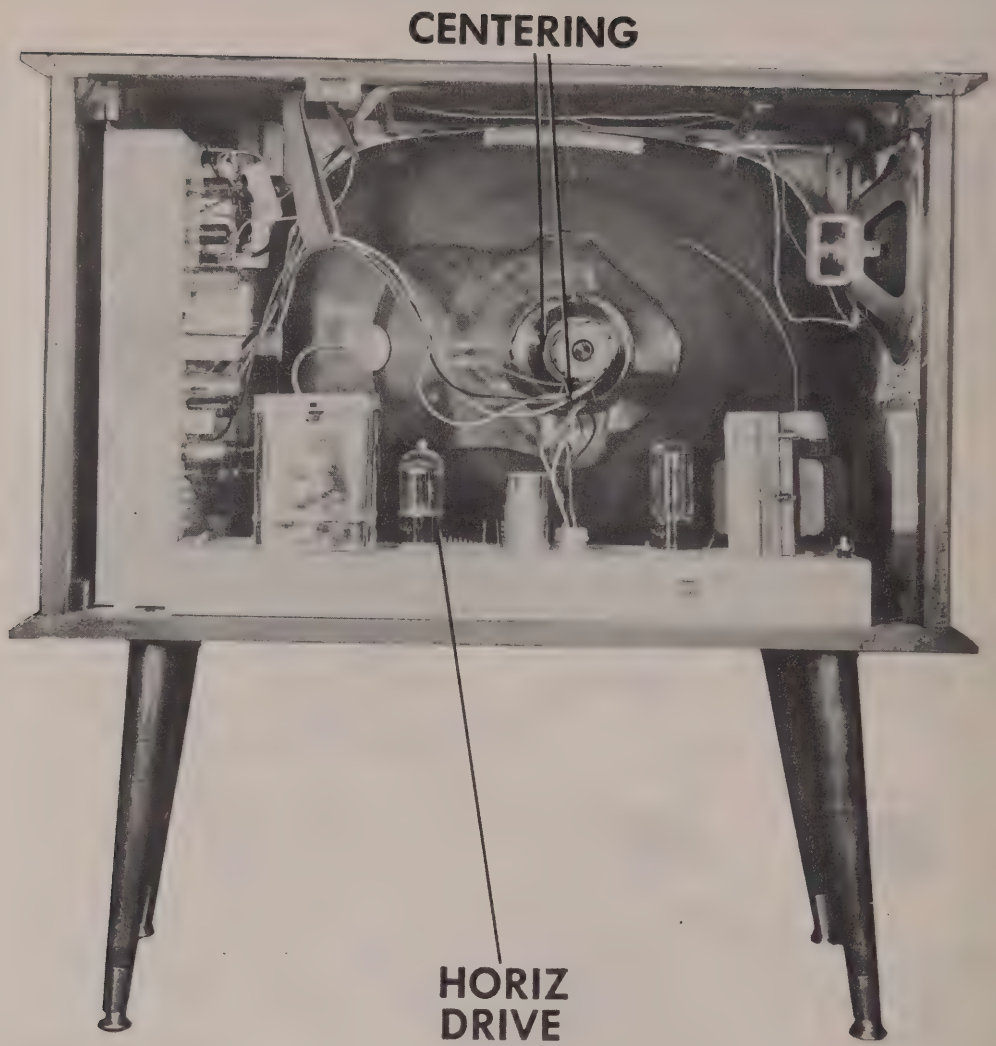


CHASSIS - TOP VIEW

TUBE PLACEMENT CHART







CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Suggested Alignment Tools:

B1, B3... GENERAL CEMENT #8271, 8273, 8275, 8276, 8721 8722, 9150, 9298, 5003
WALSCO #2516, 2519

B2..... GENERAL CEMENT #5004, 5008, 5009
WALSCO #2520

Turn the Horizontal Hold control fully clockwise. Tune in a station and adjust the Horizontal Frequency slug (B1) until the picture is just about to tear out of sync as can be seen at the top of the picture.

Turn the Contrast control fully counterclockwise and the Brightness control clockwise so that the picture appears washed out. Turn the Horizontal Drive trimmer (B2) clockwise until white vertical bars (drive lines) appear in the left center portion of the raster, then counterclockwise until the white bars just disappear.

Connect the vertical amplifier of the scope to point Ⓒ. Low side to chassis. Adjust the Horizontal Waveform slug (B3) until the round and sharp peaks of the waveform are equal in amplitude. (See Fig. 4) Keep the picture in sync during this adjustment.

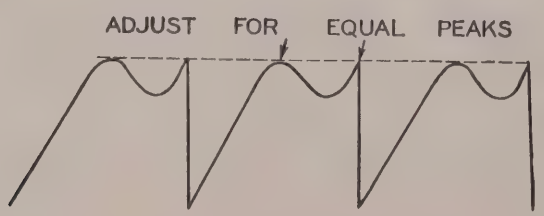


FIG. 4

PHOTOFACT® Folder

MOTOROLA CHASSIS TS-558, TS-558Y, WTS-558

MOTOROLA CHASSIS TS-558, TS-558Y, WTS-558

MODEL 21K131CW (Ch. TS-558)

MOTOROLA CHASSIS TS-558, TS-558Y, WTS-558

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SET 470 FOLDER 2

MOTOROLA CHASSIS TS-558, TS-558Y, WTS-558

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 11 wood screws holding rear cover. Remove the antenna connections and one push-on type knob from rear of cabinet. Remove rear cover.
2. Remove tuner leads, front control plug, speaker leads, HV lead, yoke plug and picture tube socket.
3. Remove 4 chassis bolts holding chassis to metal frame.
4. Remove chassis.

FRONT CONTROL PANEL REMOVAL

1. Remove 6 push-on type knobs from front of cabinet.
2. Turn Vertical Hold-Brightness control bracket one-half turn counterclockwise from rear of cabinet.
3. Remove 3 metal screws holding front control bracket (2 at bottom and 1 at top).
4. Pull out control panel at bottom until the Vertical Hold-Brightness control knobs are clear of openings. Slide out of flange at top left corner and remove.

PICTURE TUBE REMOVAL

1. Remove chassis.
2. Remove 4 bolts holding picture tube-chassis mounting frame.
3. Remove picture tube and frame.
4. Loosen 2 picture tube mounting strap bolts.
5. Remove picture tube.

MODEL 21K131CW (Ch. TS-558)

MOTOROLA CHASSIS TS-558, TS-558Y, WTS-558

TRADE NAME	Motorola	MODELS	CHASSIS
		A21K131CW, A21K132W, A21K134W, A21K135W, A21K136W ..... (Remote Control TR-6)	WTS-558
		Y21K131CW, Y21K132W, Y21K134W, Y21K135W, Y21K136W	TS-558Y
		21K131CW, 21K132W, 21K134W, 21K135W, 21K136W.....	TS-558
MANUFACTURER	Motorola Inc., 4545 W. Augusta Blvd., Chicago 51, Illinois		
TYPE SET	Television Receiver		
TUBES	VHF-Twenty, UHF-Twenty-One, Remote Control-Seven		
POWER SUPPLY	110-120 Volts AC, 60 Cycle RATING 230 Watts, 2.1 Amp. @ 117 Volts AC, less Remote Control		
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)		

SERVICING IN THE FIELD

SAFETY GLASS REMOVAL

Remove 5 screws holding the trim strip at the top edge of the safety glass. Tilt glass out and remove.

FUSE

Two fuses are used for low voltage power supply protection. (For location, see "Tube Placement Chart".)
One fuse wire is used for filament protection. (For location, see M3 in photo "Chassis Bottom View".)

TUNER OSCILLATOR ADJUSTMENTS

To touch-up the VHF Oscillator, it is necessary to remove the chassis. (See "Disassembly Instructions".)

AGC

No provision is made to vary the AGC on this receiver.

FOCUS

The focus may be varied by connecting the lead from pin 4 of the picture tube to various voltage points. (For location, see photo "Cabinet Rear View".)

HORIZONTAL OSCILLATOR FIELD ADJUSTMENTS

Coarse adjustment of the Horizontal Hold is accomplished by the proper setting of the Horizontal Frequency slug. (For location, see "Tube Placement Chart".)

WIDTH

The width may be varied by a Horizontal Size control. (For location, see "Tube Placement Chart".)

CENTERING

Centering is accomplished by 2 magnetic rings, located behind the yoke, on the neck of the picture tube.

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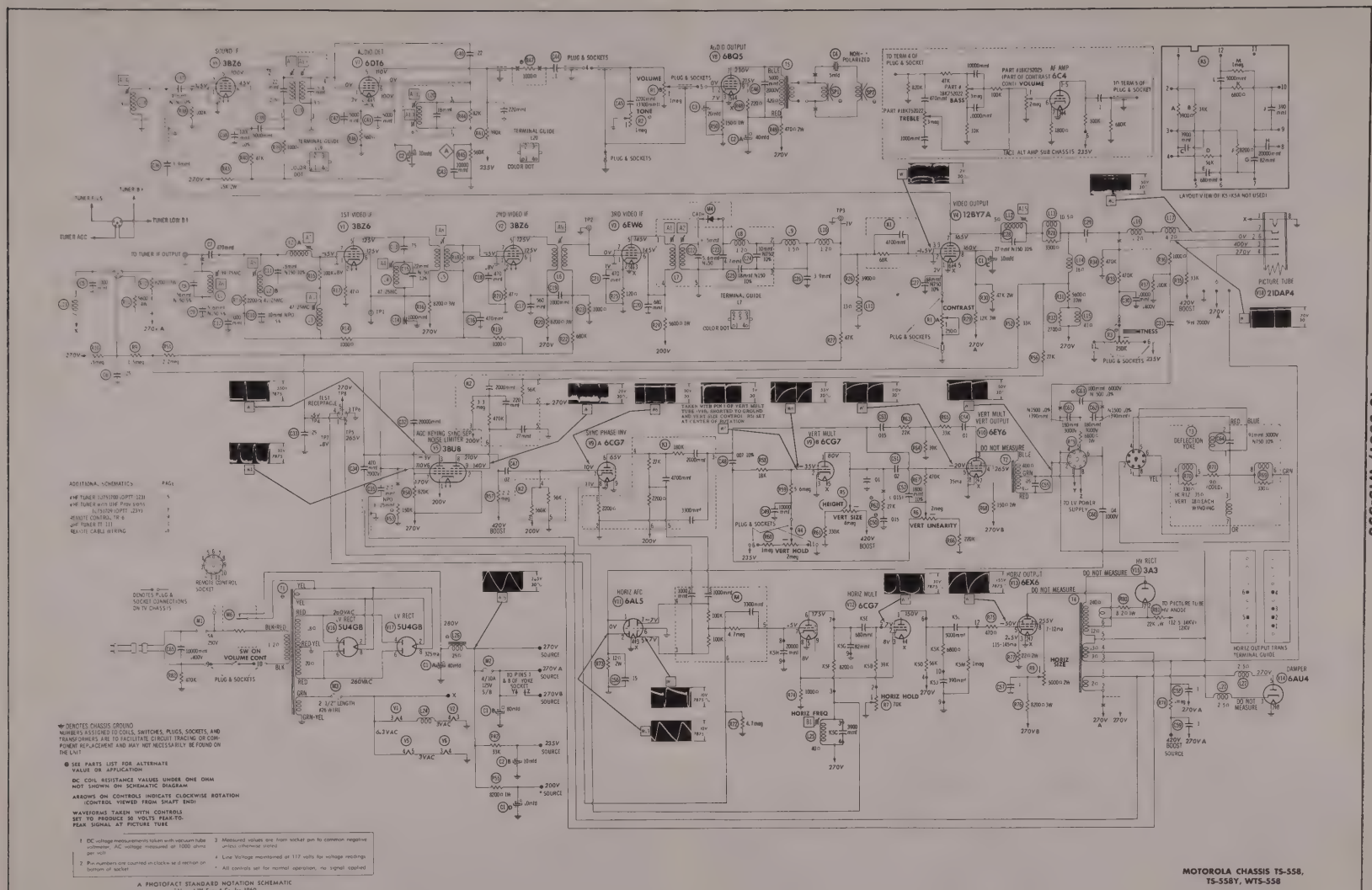
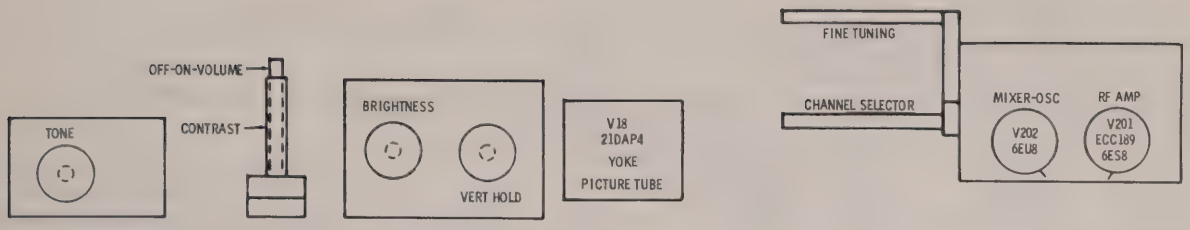
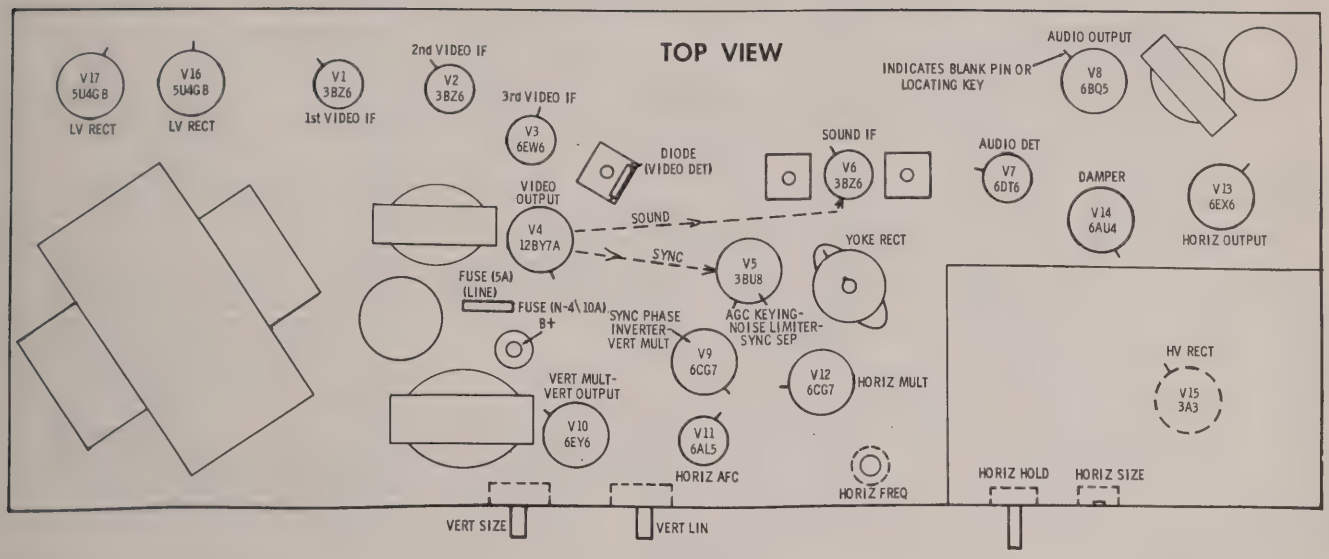
JA690

SET 470 FOLDER 2


MOTOROLA CHASSIS TS-558, TS-558Y, WTS-558
FOLDER 2
PAGE 2
PAGE 23
A PHOTOFACT STANDARD NOTATION SCHEMATIC
Howard W. Sams & Co., Inc. 1960
MOTOROLA CHASSIS TS-558, TS-558Y, WTS-558

TUBE PLACEMENT CHART





TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound Fuse (Line), Fuse (B+), Fuse (Fil.), V16, V17

SWEEP FAILURE
No raster, has sound V12, V13, V14, V15, V18
No vertical deflection V9, V10
Poor vert. linearity or foldover V9, V10
Poor horiz. linearity or foldover V12, V13, V14
Narrow picture V12, V13, V14, V16, V17
Vert. off freq. V9
Horiz. off freq. V11, V12

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster V1, V2, V3, Diode (Video Det), V4
No pic, no sound, has snow V201, V202, V1
No pic, has sound, has raster V4, V18
Has pic, no sound V6, V7, V8
Overloaded picture V5

SYNC FAILURE
No vert. sync V5, V9
No horiz. sync V5, V9, V11
No vert. or horiz. sync V5, V9

ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS

Use an ISOLATION TRANSFORMER TO PROTECT the Test Equipment.
The high voltage lead should be securely taped and kept away from the chassis.
Allow a 20 minute warm-up period for the receiver and test equipment.
Suggested Alignment Tools: GENERAL CEMENT #9050L, 9150
WALSCO #2521

VIDEO IF ALIGNMENT

Remove the yoke plug to eliminate RF interference from the horizontal sweep circuit. Connect a 1500Ω 50 watt resistor from TP-8 to TP-6. (CAUTION: TP-8 has B plus voltage on it.)
Disable the tuner oscillator by grounding the grid (pin 9) of oscillator.
Set the Noise Gate control fully counterclockwise.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Connect the negative lead of a 6 volt bias supply to TP-4. Positive to chassis.
Maintain between 2 and 5 volts peak to peak on the scope except where otherwise noted in the procedure.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	.001mfd	High side to TP-2. Low side to chassis.	44.0MC (10MC Swp)	45.75MC	13	Vert. Amp. thru 47K to TP-3. Low side to chassis. (Across Video Det. load)	A1, A2	Adjust for maximum gain and symmetry of response similar to Fig. 1 with markers as shown.
2.	Direct	High side to ungrounded tube shield floating over Mixer-Osc. tube (V202). Low side to chassis.	"	47.25MC	"	"	A3, A4	Increase scope gain. Remove bias if necessary. Adjust to place marker in trap notch. as in Fig. 2. Tune slug at end of coil away from chassis.
3.	"	"	"	41.25MC	"	"	A5	Adjust to place marker in trap notch as in Fig. 2. Tune slug at end of coil nearest chassis.
4.	"	"	"	39.75MC	"	"	A6	Adjust to place marker in trap notch as in Fig. 2. Tune slug at end of coil away from chassis.
5.	"	"	"	39.75MC 41.25MC 44.0MC 45.75MC 47.25MC	"	Vert. Amp. to TP-1. Low side to chassis.	Mixer Plate Coil & A7	Set scope for 3 volts peak to peak. Restore 6 volt bias. Adjust for maximum gain and symmetry of response similar to Fig. 3 with markers as shown. The Mixer Plate Coil affects the center peak and A7 affects the two outside peaks. Tune slugs at end of coils away from chassis. If a suckout (trap effect) occurs, detune A8 to remove.
6.	"	"	"	42.25MC 45.75MC	"	Vert. Amp. thru 47K to TP-3. Low side to chassis. (Across Video Det. load)	A8, A9	Adjust A8 to place 42.25MC marker at 50% on curve as in Fig. 4. Adjust A9 to place 45.75MC marker at 50% on other side. Tune slugs to end of coil nearest chassis. If necessary, retouch Mixer Plate Coil to correct tilt. Retouch A8 and A9 for correct response.

SOUND IF ALIGNMENT

Tune in a strong TV signal and adjust all controls for normal picture and sound.
Connect the DC probe of a VTVM to point ◇A◇. Common to chassis. Adjust A10 for maximum deflection choosing the one of two peaks that produce the highest voltage. While listening to the sound, retouch A10 for maximum sound with MINIMUM distortion.
The top slug (A11) is a preset slug which is set near the top of the coil form and left there.
Change to a very weak signal (this may be done by loosely coupling the antenna lead to the antenna terminals) that produces a hiss in the sound. Adjust A12 and A13 for maximum sound and MINIMUM distortion. Adjust A14 for maximum undistorted sound. If sound is not clear at this point, repeat the above procedure as necessary.

4.5MC TRAP ALIGNMENT

Tune in a strong TV signal and turn the Contrast fully clockwise.
Adjust the Fine Tuning until a strong 4.5MC beat pattern is visible.
Adjust A15 to find the two points at which the beat pattern is just noticeable on the screen. Tune the slug to the center of these two points. (Use the MINIMUM amount of inductance that will result in no apparent beat pattern.)

TUNER ALIGNMENT INSTRUCTIONS LOCATED ON PAGES 6, 19

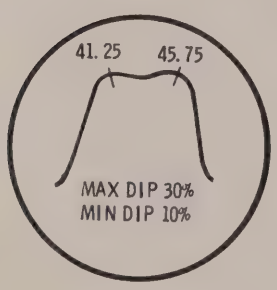


FIG. 1

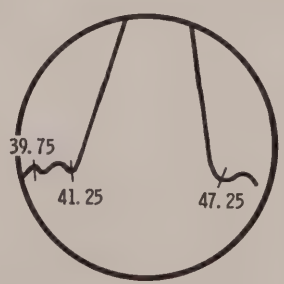


FIG. 2

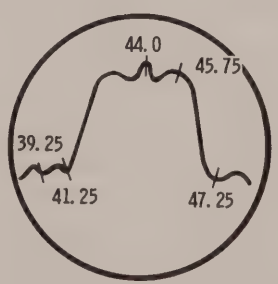


FIG. 3

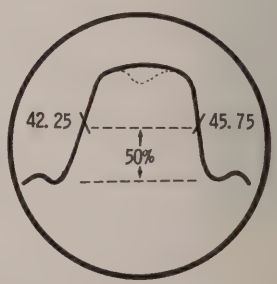
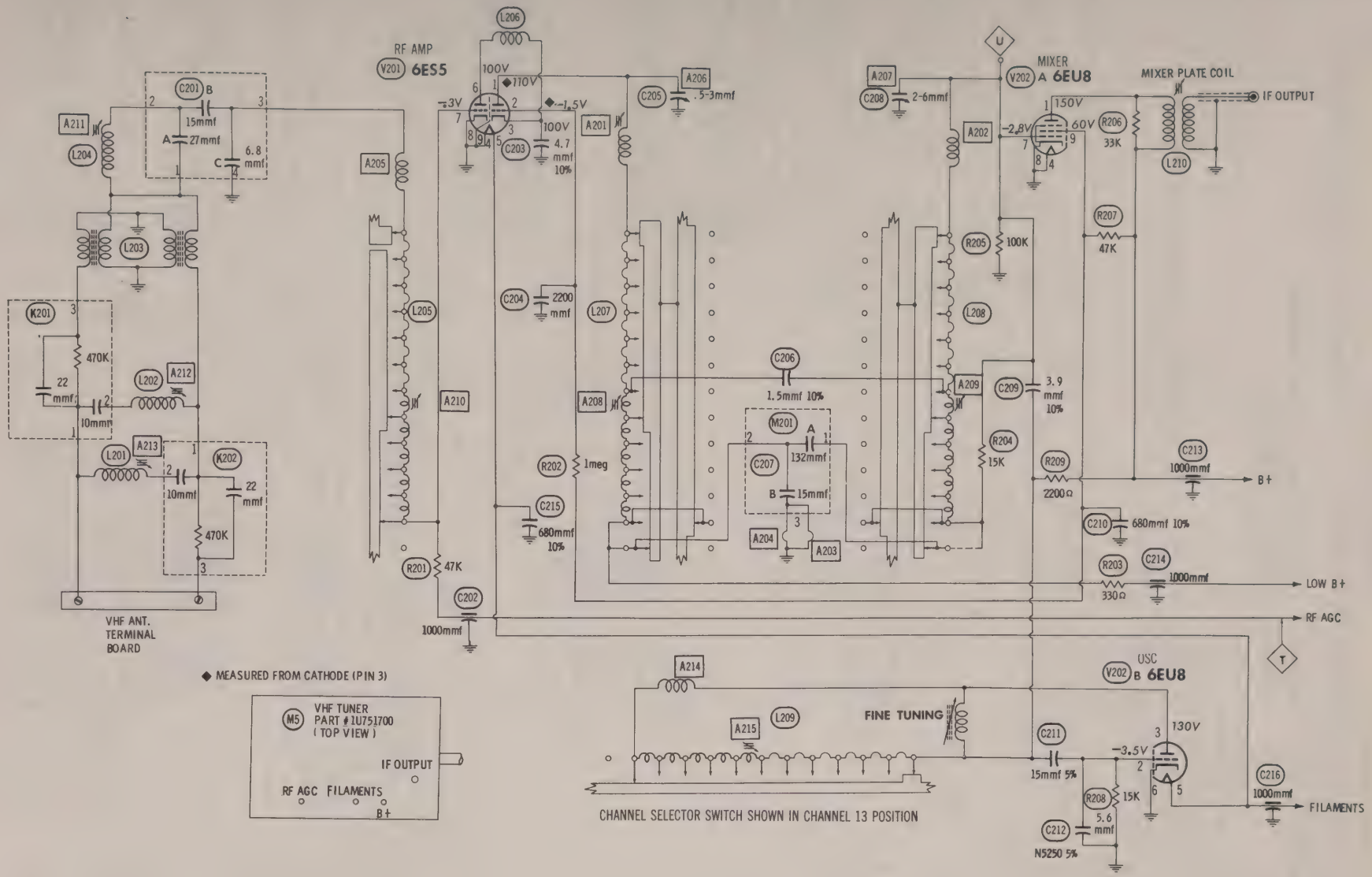


FIG. 4



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VHF TUNER 1U751700 (OPTT-123)

MOTOROLA CHASSIS TS-558, TS-558V, WTS-558

TUNER ALIGNMENT INSTRUCTIONS

1U751700 (OPTT-123)

PRE-ALIGNMENT INSTRUCTIONS

Remove the deflection yoke plug to prevent interference radiation. Connect a 1500Ω 50 watt resistor from pin 3 to pin 5 of the Service Test Receptacle.
DO NOT remove the tuner cover.
Suggested Alignment Tools: A206, A207 ..... GENERAL CEMENT #5000, 5003, 8276, 8290
WALSCO #2512, 2525
A208 thru A213... GENERAL CEMENT #9296, 9297
WALSCO #2546, 2547

VHF RF AND MIXER ALIGNMENT

Connect a clip lead from point (T) to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide a usable pattern on scope.
Coils not containing adjustable cores are adjusted by expanding or compressing coil turns.
Preset A206 and A207 so top of screw is .35" above tuner chassis.
Use 10MC sweep unless otherwise noted.

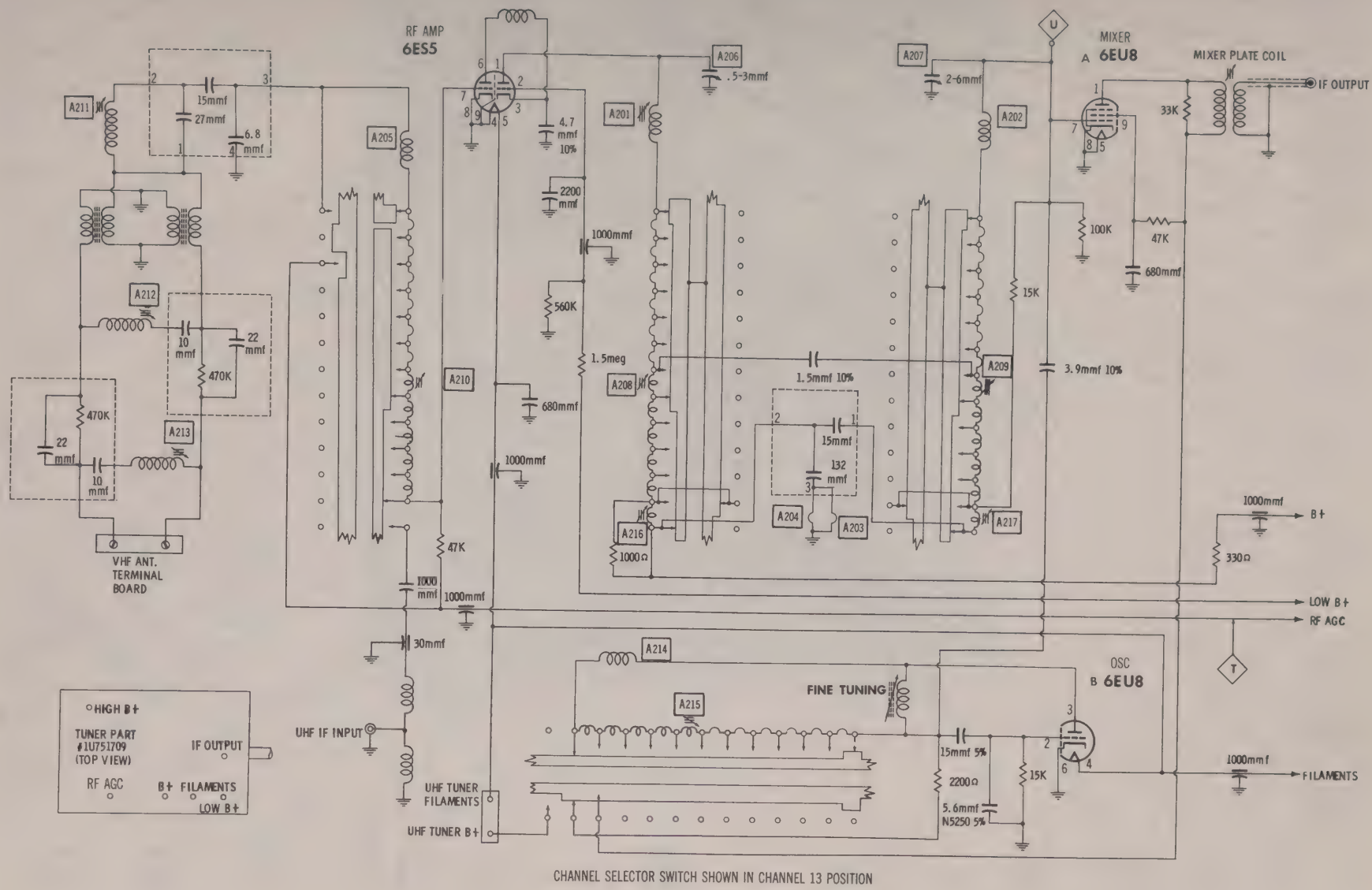
	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC	211.25MC 215.75MC	13	Vert. Amp. thru 47K to point U . Low side to chassis.	A201, A202	Adjust for maximum gain and symmetry of response similar to Fig. 201 with markers as shown.
2.	"	"	"	"	"	"	A203, A204	Adjust for proper bandwidth as in Fig. 201.
3.	"	"	"	"	"	"	A205	Adjust for maximum amplitude and MINIMUM tilt.
4.	"	"	177MC	175.25MC 179.75MC	7	"	A206, A207	Adjust A206 for proper marker position. Adjust A207 for MINIMUM tilt.
5.	"	"	85MC	83.25MC 87.75MC	6	"	A208, A209, A210	Adjust A208 to place 83.25MC marker on or near peak, A209 to place 87.75MC marker on or near other peak and A210 for maximum gain and MINIMUM tilt.
6.	"	"	"	94MC	"	"	A211	Adjust for MINIMUM response at marker or until it just starts to affect the high frequency side of response curve. NOTE : A211 may be adjusted to trap out interference between 85 and 108MC. However, make certain that no part of a desired channel is trapped out.
7.	"	"	79MC	77.25MC 81.75MC	5	"		Check for response similar to Fig. 201. If necessary make compromise adjustment of A208, A209 and A210 for proper curve on each channel.
			69MC	67.25MC 71.75MC	4			
			63MC	61.25MC 65.75MC	3			
			57MC	55.25MC 59.75MC	2			
8.	"	"	57MC	43.5MC 45.5MC	2	"	A212, A213	Adjust A212 for MINIMUM response at 43.5MC marker and A213 for MINIMUM response at 45.5MC marker. Retouch either or both for flat response consistent with MINIMUM amplitude at trap frequencies.

VHF OSCILLATOR ALIGNMENT

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the Fine Tuning to the center of its range.
Use only enough sweep generator output to provide a usable pattern on scope.
Use 10MC sweep unless otherwise noted.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC	215.75MC	13	Vert. Amp. thru 47K across Video Det. load	A214	Adjust to place marker in trap notch as in Fig. 202.
10.	"	"	207MC	209.75MC	12	"		Marker must fall into trap notch on each channel within plus or minus 750KC of specified marker frequency. If not, make compromise adjustment of A214 for all high band channels.
			201MC	203.75MC	11			
			195MC	197.75MC	10			
			189MC	191.75MC	9			
			183MC	185.75MC	8			
			177MC	179.75MC	7			
11.	"	"	85MC	87.75MC	6	"	A215	Adjust to place marker in trap notch as in Fig. 202.
12.	"	"	79MC	81.75MC	5	"		Marker must fall into trap notch on each channel within plus or minus 750KC of specified marker frequency. If not, make compromise adjustment of A215 for all low band channels.
			69MC	71.75MC	4			
			63MC	65.75MC	3			
			57MC	59.75MC	2			

continued PAGE 19



CHANNEL SELECTOR SWITCH SHOWN IN CHANNEL 13 POSITION

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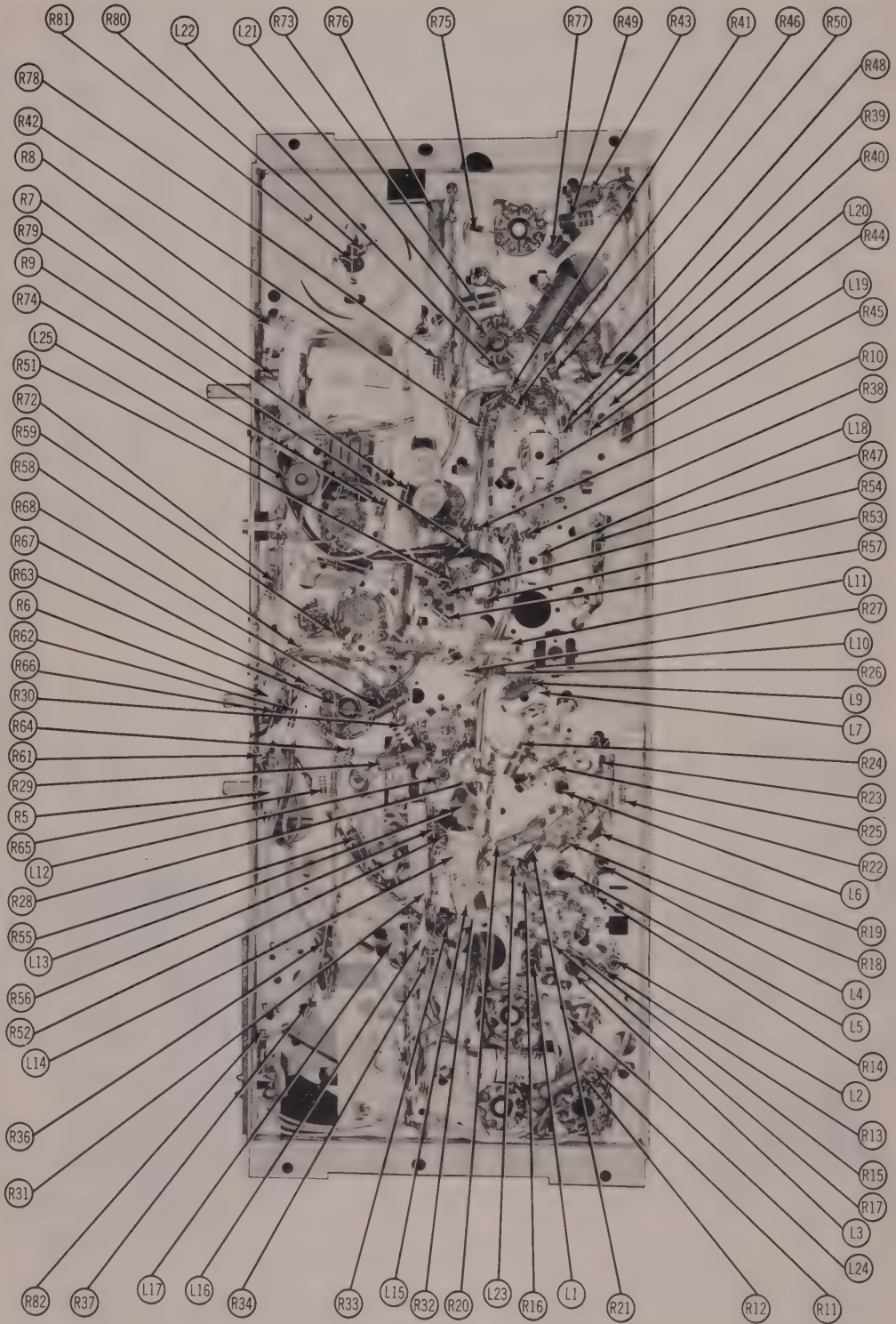
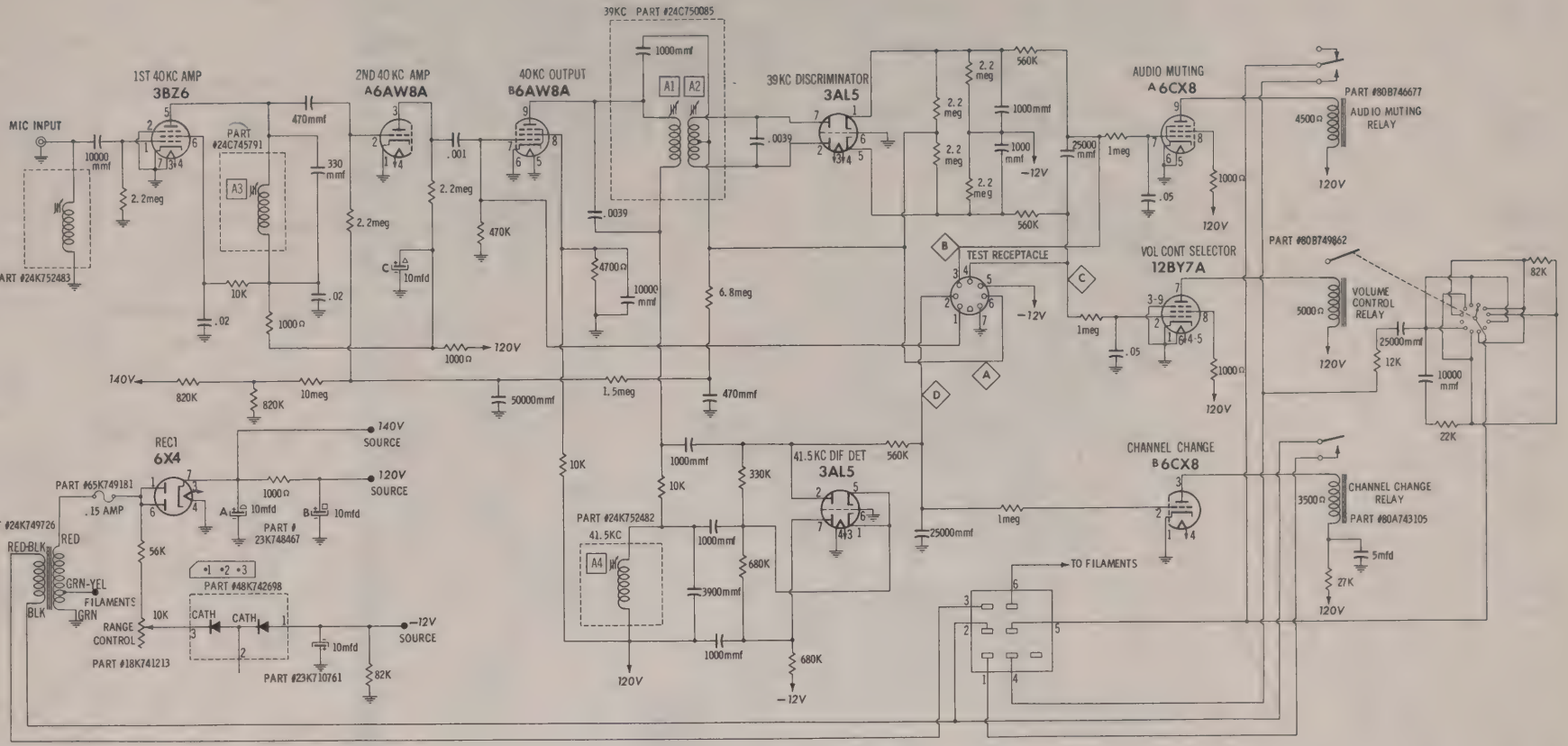
VHF TUNER with UHF Provisions 1U751709 (OPTT-123Y)



CHASSIS BOTTOM VIEW-RESISTOR AND INDUCTOR IDENTIFICATION

MOTOROLA CHASSIS TS-558, TS-558V, WTS-558



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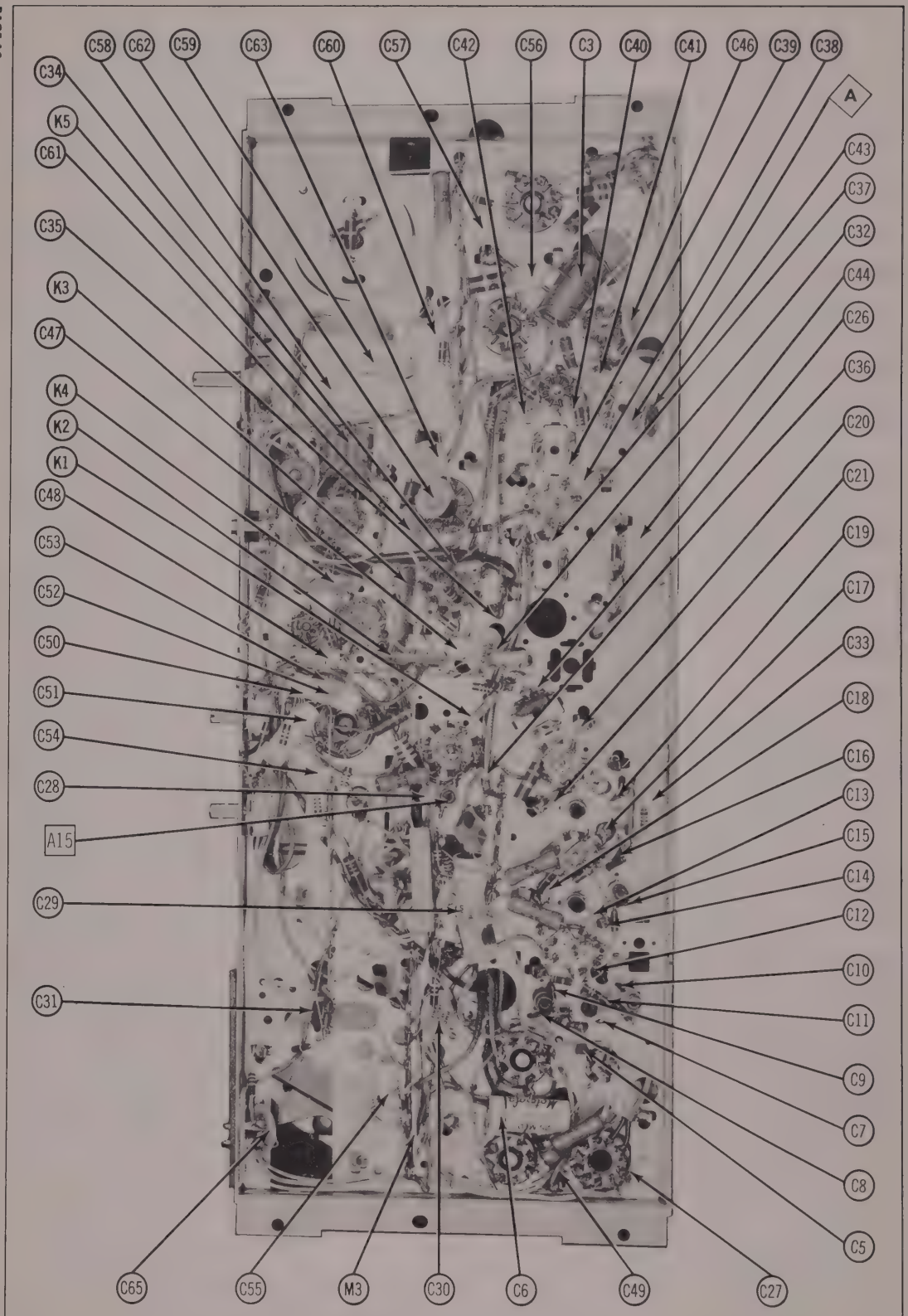
REMOTE CONTROL TR-6

MOTOROLA CHASSIS TS-558, TS-558Y, WTS-558



CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

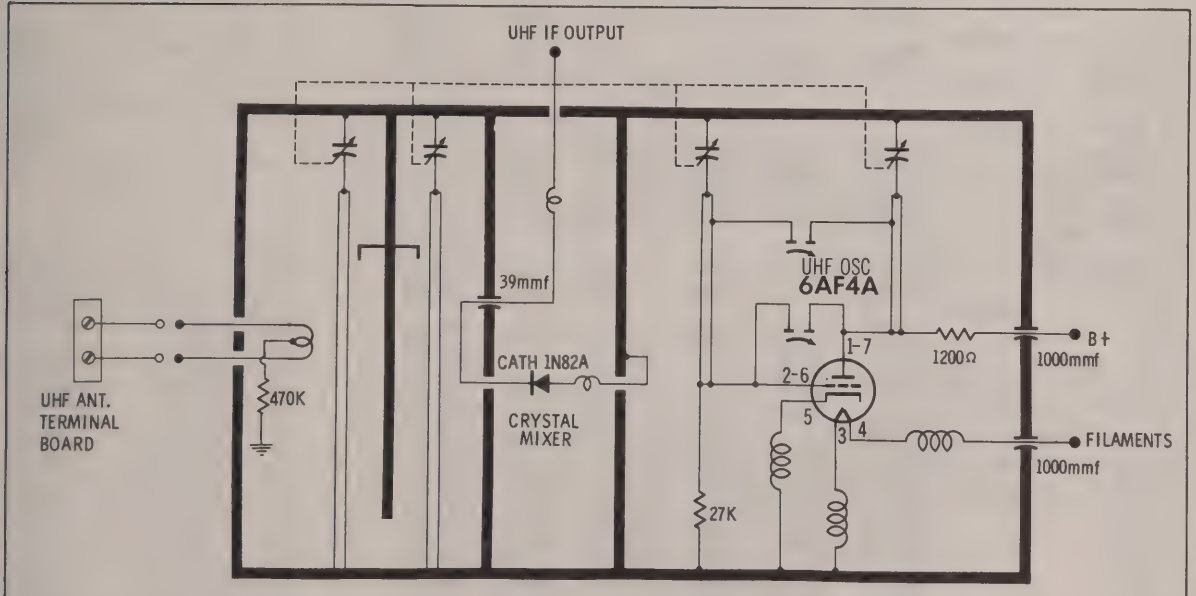
MOTOROLA CHASSIS TS-558, TS-558V, WTS-558

RESISTANCE MEASUREMENTS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	3BZ6	680K	47Ω	.1Ω	.4Ω	†8200Ω	†8200Ω	0Ω		
V2	3BZ6	680K	47Ω	0Ω	.4Ω	†8200Ω	†8200Ω	0Ω		
V3	6EW6	1000Ω	120Ω	.1Ω	0Ω	†14K	†14K	0Ω		
V4	12BY7A	• 20Ω	72K	0Ω	.1Ω	.1Ω	0Ω	†5600Ω	†12K	0Ω
V5	3BU8	†8200Ω	†0Ω	1meg	.1Ω	.4Ω	†35K	†820K	†3.2meg	3.7meg
V6	3BZ6	100K	0Ω	.4Ω	.1Ω	†16K	†62K	0Ω		
V7	6DT6	3.5Ω	560Ω	.1Ω	0Ω	†420K	†15K	560K		
V8	6BQ5	0Ω	0Ω	150Ω	.1Ω	0Ω	NC	†890Ω	TP	†690Ω
V9	6CG7	•†3.2meg	•1.6meg	0Ω	0Ω	.1Ω	†37K	56K	2200Ω	0Ω
V10	6EY6	NC	0Ω	†400Ω	†150Ω	•1.6meg	NC	.1Ω	0Ω	
V11	6AL5	12Ω	12Ω	.1Ω	0Ω	4.8meg	0Ω	4.8meg		
V12	6CG7	†56K	•50K	1000Ω	.1Ω	0Ω	†8200Ω	9.4meg	1000Ω	NC
V13	6EX6	TP	0Ω	22Ω	NC	1meg	NC	.1Ω	•†11K	TOP CAP †14.5Ω
V14	6AU4	NC	TP	¶4.5meg	NC	†4.5Ω	TP	0Ω	.1Ω	
V15	3A3	PINS 1 THRU 8 HAVE INFINITE RESISTANCE								TOP CAP †255Ω
V16	5U4GA	TP	¶	NC	18Ω	NC	20Ω	NC	¶	
V17	5U4GA	TP	¶	NC	18Ω	NC	20Ω	NC	¶	
V18	21DAP4	.1Ω	100K	†1meg	†0Ω	NC	100K	•250K	0Ω	
V201	ECC189/ 6ES8	†5900Ω	1meg	INF	0Ω	.1Ω	INF	3meg	0Ω	0Ω
V202	6EU8	†8200Ω	15K	†10K	0Ω	.1Ω	0Ω	100K	0Ω	†55K
ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
• THIS READING WILL VARY. CONTROL SET FOR NORMAL OPERATION.
† MEASURED FROM 270V SOURCE.
‡ MEASURED FROM PIN 3 OF V14.

NC NO CONNECTION
TP TIE POINT



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UHF TUNER TT-111

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	CBS · GENERAL ELECTRIC · USE	TYPE	ITEM No.	RAYTHEON · SYLVANIA · USE	TYPE
V1	1st Video IF Amp.	3BZ6	V9	Sync Phase Inv.-Vert. Mult.	6CG7
V2	2nd Video IF Amp.	3BZ6	V10	Vert. Mult.-Vert. Output	6JT6
V3	3rd Video IF Amp.	6KW6	V11	Horiz. AFC	6AL6
V4	Video Output	12BY7A	V12	Horiz. Mult.	6CG7
V5	AGC Keying-Noise Limiter-Sync Sep.	3BU8	V13	Horiz. Output	6JE8
V6	Sound IF Amp	3BZ6	V14	Damper	6AU4
V7	Audio Det.	6DT8	V15	HV Rect.	3A3
V8	Audio Output	6BQ5	V16	LV Rect.	5U4GB
			V17	LV Rect.	5U4GB

PICTURE TUBE

ITEM No.	REPLACEMENT DATA: MOTOROLA PART No.	GENERAL ELECTRIC PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	NOTES
V18	21DAP4	21DEP4 ①	21DAP4 ①		21DAP4/ 21DEP4/ 21DEP4A ②	① Aluminized. ② "Silver Screen 85"

ELECTROLYTIC CAPACITORS

ITEM No.	RATING: CAP.	VOLT.	REPLACEMENT DATA: MOTOROLA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	⌀40	300	23KT4154l	AFS4-00-50	D0044	FP430-41	TMQ-143	TVL-4710.2	
B	⌀80	300							
C	⌀10	300							
D	10	300							
C2A	⌀40	300	23KT5172O	AFS3-30-35	C0225	FP333.5	TMD-47 TD-40-350	TVL-3687.4	
B	10	300							
C	⌀10	300							
C3	30	25	23KT39296	FRS330	BBR30-25	TC36	TD-30-250	TVA-1710	
C4	5	10VMP	23AS3250	MP-PR37606	BBR10-25 ①	TC3036		TVA8-1110 *	

† Use 2 units. Connect negative terminals together.
* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA: AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No	MALLORY PART No.	SPRAGUE PART No.
C5	1000		BPD-001	DD-102	BYA10D1	CCD-102	GP310	5HK-D10
C6	.25 100V		PS88N-25		CUB2P25	1DP-3-254	GEM-2025	2TM-P25
C7	470		BPD-00047	DD-471	BYA10T47	CCD-471	GP347	5GA-T47
C8	56 N150 5%	#2IR136899				**		10TCP-Q56
C9	5.6 N150 5%	#2IR129194				**		10TCP-T56
C10	10 NPO 5%		NPO-DI 10	DTZ-10	C10Q10C	**	CNO-410	10TCC-Q10
C11	18 N150 10%	#2IR130678				**		10TCP-Q18
C12	1000		BPD-001	DD-102	BYA10D1	CCD-102	GP210	5HK-D10
C13	.75					**		
C14	1000		BPD-001	DD-102	BYA10D1	CCD-102	GP210	5HK-D10
C15	22 N150 10%	#2IR130539				**		10TCP-Q22
C16	470		BPD-00047	DD-471	BYA10T47	CCD-471	GP347	5GA-T47
C17	560		DI-560	DD-561	L10T56	CCD-561	GP356	5GA-T56
C18	470		BPD-00047	DD-471	BYA10T47	CCD-471	GP347	5GA-T47
C19	1000		BPD-001	DD-102	BYA10D1	CCD-102	GP210	5HK-D10
C20	680		BPD-00068	DD-681	BYA10T68	CCD-681	GP368	5GA-T68
C21	470		BPD-00047	DD-471	BYA10T47	CCD-471	GP347	5GA-T47
C23	5.6 N150 ±.5mmf	#2IR136894				**		10TCP-T56
C24	4.7		NPO-4R 4.7	TCZ-4R7	C10V47C	CCTO-4R7	CNO-4R7	10TCC-V47
C25	10 N750 10%		N750-DI 10	DTN-10	C10Q5U	CCTN-100	CNT-465	10TCU-Q47
C26	18 N150 10%	#2IR130678				**		10TCP-Q18
C27	3.9				C10V4C			10TCC-V39
C28	68 N750 10%		N750-DI 68	DTN-68	C10Q68U	CCTN-68	CNT-468	10TCU-Q68
C29	27 N150 10%	#2IR129896				**		10TCP-Q27
C30	.1 600V		PS88N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P1
C31	10000 1400V		DAC-37	DD68-103	HVH168	16DP-3-103	3HV-110	BL-B10
C32	5000 3000V			DD30-502	HVC30D5		3HV-347	BL-D50
C33	3000		BPD-03	DD-302	BYB36S	CCD-303	GP130	5HK-E30
C34	.25 100V		PS88N-25		CUB2P25	1DP-3-254	GEM-2025	2TM-P25
C35	470 3000V		HVD-30-470	DD30-471	HVB30T47	VCM-35-471M	3HV-347	30GA-T47
C35	2.7 NPO ±.25mmf							10TCC-V27
C36	3.9				C10V4C			10TCC-V39
C37	47 N750 10%		N750-DI 47	DTN-47	C10Q47U	CCTN-470	CNT-447	10TCU-Q47
C38	1000 10%		DI-1000	DD-102	1RS01	CCD-102	GP210	10TS-D10
C39	5000		BPD-005	DD-502	BYA10D5	CCD-502	GP250	5HK-D50
C40	.25	#2IR747300						
C41	5000		BPD-005	DD-502	BYA10D5	CCD-502	GP250	5HK-D50
C42	5000		BPD-005	DD-502	BYA10D5	CCD-502	GP250	5HK-D50
C43	10000		BPD-01	DD-103	BYA10E1	CCD-103	GP110	5HK-E10
C44	.1 400V		PS88N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P1
C45	2200	(3300mmf)*	BPD-0023	DD-232	BYA10D232	CCD-232	GP232	5HK-D23
C46	5000 2000V			DD30-502	HVC30D5		3HV-347	BL-D50
C47	.02 600V		PS68N-03	DD-303	CUB6S3	6DP-3-203	GEM-612	6TM-S2
C48	.007 400V 10%		V84C4886-10%		PMSD68	16DP-3-702	GEM-1627	6TM-D68
C49	10000		BPD-01	DD-103	BYA10S1	CCD-103	GP110	5HK-E10
C50	.015 600V	Note 1	PS68N-015	DD68-153	CUB6S3	6DP-2-153	GEM-615	6TM-S15
C51	.02 600V		PS68N-03	DD-203	CUB6S3	6DP-2-203	GEM-612	6TM-S2
C52	1800 10%	.015mfd 400V*	DE-1800	DD-182	1RSD18	CCS-182	GP218	10TS-D18
C53	.015 400V		PS68N-015	DD68-153	CUB6S15	6DP-1-153	GEM-4115	4TM-S15
C54	.01 600V		PS68N-01	DE-103	CUB6S3	6DP-2-103	GEM-611	6TM-S1
C55	.05 400V		PS68N-05	DD-503	CUB4S5	4DP-3-503	GEM-415	4TM-S5
C56	.15 100V		PS88N-15		CUB2P15	1DP-3-154	GEM-2025	2TM-P15
C57	.1 400V		PS88N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P1
C58	.1 600V		PS88N-1	DF-104	CUB6P1	6DP-4-104	GEM-601	6TM-P1
C59	.1 600V		PS68N-1	DF-104	CUB6P1	6DP-4-104	GEM-601	6TM-P1
C60	.04 1000V		PD68M-04		CUB6S4	16DP-3-403	GEM-1014	MB-36
C61	180 3000V N1500 10%	(390mmf)*						
C62	180 3000V N1500 10%	(390mmf)*						
C63	100 600V N1500 10%	Note 1						
C64	91 3000V N750 10%							3DY-310
C65	10000 1400V		DAC-37		HVH168	16DP-3-103	3HV-110	BL-B10

Motorola Part Number. * Alternate value. Note 1. Not used in some versions.
** Not normally in distributor's stock. Available thru distributor on order to manufacturer.

CONTROLS

ITEM No.	RATING: RESIST-ANCE	WATTS	REPLACEMENT DATA: MOTOROLA PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	250Ω	½	18KT53035					✓Contrast
B	2meg	½						■UX-4078-B Volume
C	Switch							✓Push-Push Off-On
R2A	1meg	½	18KT53021	B-70	A47-1meg-Z	Q13-127	U53	Tone, Note 1
B	Shaft			Not Req.	F8-3	Not Req.	Not Req.	
R3	250K	½	18KT55310				TA254L	Brightness, Note 2
R4	1meg	½	18KT53030				TA261L	Vert. Hold
R5A	4meg	1	18KT43524	AB-86	A47-4meg-S	B11-240	PTA56L	Vert Size
B	Shaft			AK-19	RM-3	TM4	Not Req.	
R6A	2meg	½	18KT43523	AB-75	B47-2meg-S	B11-139	PTA29L	Vert. Lin.
B	Shaft			AK-19	Not Req.	TM4	Not Req.	
R7A	70K	½	18KT48326	AB-73	A47-75K-S	B11-135	PTA8L	Horiz. Hold
B	Shaft			AK-19	RM-3	TM4	Not Req.	
R8A	5000Ω	3(WW)	17B746869	WN-502	A43-5000	WW8-5000	PVL6K	Horiz. Size
B	Shaft			Not Req.	FK8-1/4	Not Req.	Not Req.	

Note 1. Some versions may use 3meg Bass and 3meg Treble (Singles) (Part #18KT52023).
Note 2. Some versions may use 250K Brightness with 100K stop (Part #18KT53019).
■ "STA-LOC" Equivalent: FB251L, RUP255L, OS175.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R9	1.5meg	
R10	15meg	
R11	5800Ω 4W	
R12	22000 3W	
R13	2200Ω	
R14	1000Ω	
R15	100K	
R16	6300Ω 3W	
R17	47Ω	
R18	10K	
R19	1000Ω	
R20	62000 3W	
R21	47Ω	
R22	680K	
R23	1000Ω	
R24	56000 1W	
R25	120Ω	
R26	3900Ω	
R27	47K	
R28	5300Ω	
R29	12K 3W	
R30	47K 2W	
R31	56000 10W	
R32	2700Ω	
R33	470K	

ITEM No.	RATING	REMARKS
R34	470K	
R35	33K	
R36	1000Ω	
R37	100K	
R38	100K	
R39	1000Ω	
R40	47K	
R41	390K	
R42	33K	
R43	15K 2W	
R44	82K	
R45	560K	
R46	560Ω	
R47	1000Ω	Note 1
R48	330Ω	
R49	4700 3W	
R50	1500 1W	
R51	2.2meg	
R52	33K	
R53	10K	Note 1
R54	820K	
R55	5200Ω 1W	
R56	27K	
R57	2.2meg	
R58	18K	

ITEM No.	RATING	REMARKS
R59	5.6meg	
R60	1meg	
R61	330K	
R62	27K	Note 1
R63	22K	
R64	39K	
R65	33K	
R66	230K	
R67	470K	
R68	1500 1W	
R69	330Ω	
R70	330Ω	
R71	9Ω Cold	
R72	4.7meg	
R73	120 2W	#6K129647
R74	1000Ω	
R75	470Ω	
R76	6200Ω 3W	
R77	22Ω 2W	
R78	1meg	
R79	6800Ω 1W	
R80	8.2Ω 1W	#6K128098
R81	22K 1W	
R82	470K	

Motorola Part Number. Note 1. Not used in some versions.

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	MOTOROLA PART No.	REPLACEMENT DATA
X1	Video Output Grid	470mmf, 68K	51K744975	
X2	Sync Sep. & Sync Phase Inv. Grid	27mmf, 330mmf, 3000mmf, 56K, 98K, 470K, 560K, 3.9meg	51B747698	Sprague HN-5
X3	Vert. Integrator	3000mmf, 3300mmf, 4700mmf, 2300Ω, 2200Ω, 27K, 180K	51B747379	Sprague VF-3
X4	Horiz. AFC	1000mmf, 1000mmf, 3300mmf, 100K, 100K, 4.7meg	51B747561	Sprague F-6
X5	Horiz. Sweep Circuit	82mmf, 390mmf, 680mmf, 3300mmf, 5000mmf, 20000 mmf 3900Ω, 6800Ω, 8200Ω, 39K, 56K, 1meg	51C749191	

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA: MOTOROLA PART No.	Gremar PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	NOTES
L1	39.75MC Trap	24KT47583	20-1044 ■	20-1044 ■	TV-152			
L2A	1st Video IF	24KT47586						
B	2nd Video IF	24KT47587						
L3	47.25MC Trap	24KT50578	17-4538 ▲	17-4538 ▲	TV-153 ▲	6225 ▲		
L4	47.25MC Trap	24KT47585	20-1049	20-1049	TV-153 ▲	6235 ▲		
L5	2nd Video IF	24KT47587	17-4522	17-4522	TV-130	6216	VF-3	
L6	3rd Video IF	24KT51248	17-4522	17-4523	TV-130	6219	VF-3	
L7	4th Video IF	24KT47584						
L8	Resonant Choke	24KR19889						8.5uh
L9	Resonant Choke	24A733225						10uh
L10	Resonant Choke	24KR19893						9.5uh
L11	Shunt Peaking Coil	24KT49659	19-3330	19-3330	TV-200	6152	VP-7	330uh
L12	4.5MC Trap	24KT39290	20-1004	20-1004	TV-151	1650 ▲	SF-3	
L13	Series Peaking Coil	24KT52251	19-3275	19-3275	TV-198	6130	VP-6	270uh ①
L14	Shunt Peaking Coil	24KT49508	19-3300	19-3300	TV-203	6174	VP-8	500uh
L15	Shunt Peaking Coil	24KT49658	19-1041	19-1041	BC-514	4664		1400uh ②
L16	Resonant Choke	24KR19869						8.5uh
L17	Series Peaking Coil	24KT50835	19-3100	19-3100	TV-194	6112		100uh
L18	1st Sound IF	24KT51499						
L19	2nd Sound IF	24KT53234	17-3496	17-3496	TV-123	6203	SF-3 SD-5	
L20	Quadrature Coil	24KT51493						
L21	RF Choke	24B75717				4611		7.5uh
L22	RF Choke	24B74717				4611		7.5uh
L23	Fil. Choke	24KT49675	19-1001	19-1001	BC-562	4604		1.5uh
L24	Fil. Choke	24KT43575	19-1001	19-1001	BC-562	4604		1.5uh

† Includes M4.
■ Remove cap. supplied and use original cap.
▲ Disregard tap.
① Includes 3300Ω resistor.
② Includes 2700Ω resistor.

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES.: PRI.	SEC.	REPLACEMENT DATA: MOTOROLA PART No.	Hollderson PART No.	Merit PART No.	Miller PART No.	Ram PART No.	Thordarson PART No.	NOTES
L25	40Ω		24KT43436	HS-5 *	TV-185 ▲	6210 *	H-102 *	HS-5 *	Horiz. Stabilizer * Drill larger mtg. hole. ▲ Disregard tap.

FILTER CHOKE

ITEM No.	RATINGS: CURRENT (Measured)	DC RES	INDUCTANCE (0 CURRENT 1000 ^Ω)	REPLACEMENT DATA: MOTOROLA PART No	Hollderson PART No	Merit PART No	Ram PART No	Stancor PART No.	Thordarson PART No	Triad PART No
L26	325A	35Ω	1 hy.	25KT51796AD ↓				C-2326 ②		C-28X

① Alternate Part #25KT51796. ② Drill new mounting hole

TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	SEC 1	SEC 2	MOTOROLA PART No.	Hollderson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V ④ 2.1A	620VCT ② .325A	6V ④ 6A	25KT51795N ①						
	SEC. 3	SEC. 4	SEC. 5							
	6.3V ⑤ 10A									

① Alternate Part #25KT51795.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA: MOTOROLA PART No.	Hollderson PART No.	Merit PART No.	Ram PART No.	Rogers PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T3	Vert. Output	25KT48756	26B13 ①	A-2854	V307 ③	VO84 ③	VO-100 ③	26B13 ①	A-11EX ③
T5	Yoke-Horiz. (18.6MH) (10%)-Vert. (32MH)	34KT51948	Y-53 ③ ⑤					Y-53 ④ ⑤	Y-62 & NW-30 ⑤
	Rear Cover & Centering Device	50CT51843							TC-110
	Yoke Clamp	42A743819							
T4	Horiz. Output	24KT46570 ①							D-174 ③
	Primary Coil	24KT46571							
	Secondary Coil	24CT44043							

① Cut and tape red-yellow lead.
② Connect as autoformer.
④ Cut and tape red-black lead.
⑤ Remove 27mmf capacitor from horizontal yoke terminals #2 and #7. Use original rear cover and centering device.
③ May require 6mmf ⑤ 3KV capacitor added across yoke terminals #2 and #1.
⑤ Complete transformer assembly.

*	Original Connection	8	5	4	3	2	1	
	Tried	8	5	4A	3A	2	1	Remove jumper from 2 to 7

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI.	SEC.	REPLACEMENT DATA: MOTOROLA PART No.	Hollderson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T6	5000Ω	6-8Ω	25KT49146D ①	24A64	A-2902	AU-604	A-3337	24A64	S-53X

① Alternate Part #25KT49146.

SPEAKER

ITEM No.	TYPE: SIZE	FIELD	V. C. IMP.	REPLACEMENT DATA: MOTOROLA PART No.	QUAM PART No.	NOTES
SP1	8"	PM	7-9Ω	50KT53031 ①	6A312S	① Models A2K153CW, Y2K153CW, Z1K153CW
SP2	6"	PM	6-8Ω	50KT46515 ②	4A12T. 6	② Some versions may use Part #50KT46444.
	8" x 2"	PM		50KT49585 ③		③ Models A2K153W, Y2K153W, Z1K153W,
	8"	PM	6-8Ω	50KT49597 ④	6A812S. 7	Z1K152W, Z1K156W
	8"	PM		50DT49580 ⑤		④ Models A2K154W, A2K155W, Y2K154, Y2K155W,
						Z1K154W, Z1K155W
						⑤ Models A2K154W, A2K155W, A2K156W,
						Y2K154, Y2K155W, Y2K156W, Z1K154W, Z1K156W,
						Z1K156W

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA: MOTOROLA PART No. FUSE	HOLDER	LITTELFUSE PART No. FUSE	HOLDER	BUSS PART No. FUSE	HOLDER
M1	3AG	5A 250V	65A742512	31A737466	312005 (3AG 5A 250V	357001	MTH5	44005
M2	N	4/10A 125V	65K751794	9K750575	333.400 (N 4/10A 125V	345009	N 4/10	HN 3/10 to 1/2
M3	2½"	3/8 Length	#26 Wire					

MISCELLANEOUS

ITEM No.	PART NAME	MOTOROLA PART No.	NOTES
M5	Tuner	10T51700	VHF (OPTT-123)
	Tuner	1V753414	VHF (4A7T-117)
	Tuner	10T51709	VHF with UHF Provisions (OPTT-123Y)
M6	Thermostat Assy.	87C49805	(Thermal Switch)

PARTS LIST AND DESCRIPTIONS (Continued)

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA				NOTES
		MOTOROLA PART No.	CBS PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
M4	Clevite	48K747548	1N60	1N295	1N295	Video Det. (Plug-in)

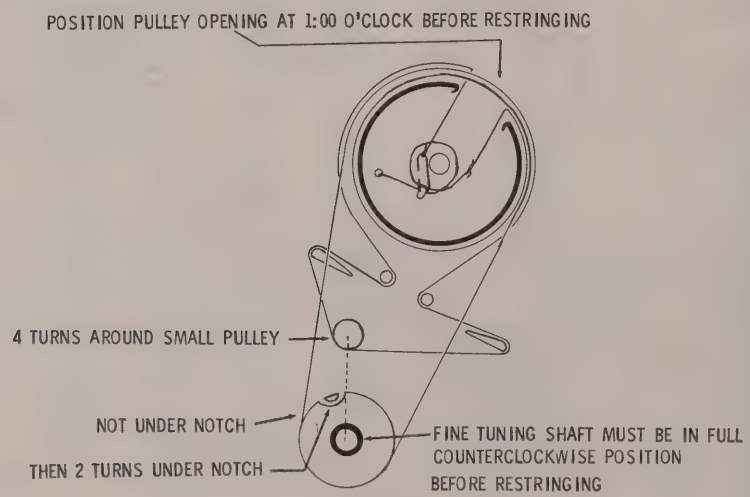
CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Safety Glass	61K752965	
Mask	13F751503	Picture Tube, Models 21K131CW, Y21K131CW, 21K132W, Y21K132W, 21K134W, Y21K134W, 21K135W, Y21K135W, 21K136W, Y21K136W
Mask	13K751911	Picture Tube, Models A21K131CW, A21K132W, A21K134W, A21K135W, A21K136W
Knob	1B751718	Channel Selector, All models except A21K131CW, A21K132W, 4W, 5W, 6W
Knob	36B752870	Preset Channel Selector & Fine Tuning, Models A21K131CW, 2W, 4W, 5W, 6W
Pushbutton Assy.	1V752909	Channel Selector, Models A21K131CW, 2W, 4W, 5W, 6W
Knob	1V751931	Fine Tuning (Front) All VHF Models except A21K131CW, 2W, 4W, 5W, 6W
Knob	36K751696	Fine Tuning (Rear), All VHF Models except A21K131CW, 2W, 4W, 5W, 6W
Knob	1B751730	Fine Tuning, All UHF Models
Knob	34C751731	UHF Dial Scale, All UHF Models
Knob	1V751924	Off-On Volume
Knob	36B751755	Brightness, Vert. Hold
Knob	36K751697	Contrast
Knob	36K746089	Horiz. Hold
Knob	1V752229	Tone (Includes Bushing)
Cabinet	16E752447	Models 21K131CW, Y21K131CW
Cabinet	16E752447	Model A21K131CW
Cabinet	16E752372	Models 21K132W, Y21K132W, A21K132W
Cabinet	16E751875	Models 21K134W, Y21K134, A21K134W
Cabinet	16E751904	Models 21K135W, Y21K135W, A21K135W
Cabinet	16F751898	Models 21K136W, Y21K136W, A21K136W
Cabinet Door	16K749073	Right Hand, Models A21K134W, 21K134W, Y21K134
Cabinet Door	16K749074	Left Hand, Models A21K134W, 21K134W, Y21K134
Cabinet Door	16K750830	Right Hand, Models 21K135W, Y21K135W, A21K135W
Cabinet Door	16K750831	Left Hand , Models 21K135W, Y21K135W, A21K135W
Cabinet Door	16K749077	Right Hand, Models 21K136W, Y21K136W, A21K136W
Cabinet Door	16K749078	Left Hand, Models 21K136W, Y21K136W, A21K136W
Cabinet Leg	16K749075	Models 21K134W, Y21K134, A21K134W

WIRING DATA

High Voltage Lead	Use BELDEN No.	8869
Shielded Hook-up Wire	Use BELDEN No.	8885 (Single Conductor) 8738 (Two Conductor)
General-use Unshielded Hook-up Wire	Use BELDEN No.	8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord (Interlock Type)	Use BELDEN No.	8874
300Ω Tuner Input Lead	Use BELDEN No.	8225
300Ω Antenna Lead-in	Use BELDEN No.	8230 or 8275
Antenna Rotor Cable	Use BELDEN No.	8464 (Flat) or 8484 (Round) - 4 Conductor 8485 (Round) - 5 Conductor 8488 (Round) - 8 Conductor


POSITION PULLEY OPENING AT 1:00 O'CLOCK BEFORE RESTRINGING
4 TURNS AROUND SMALL PULLEY
NOT UNDER NOTCH
THEN 2 TURNS UNDER NOTCH
FINE TUNING SHAFT MUST BE IN FULL COUNTERCLOCKWISE POSITION BEFORE RESTRINGING

UHF DRIVE CORD STRINGING

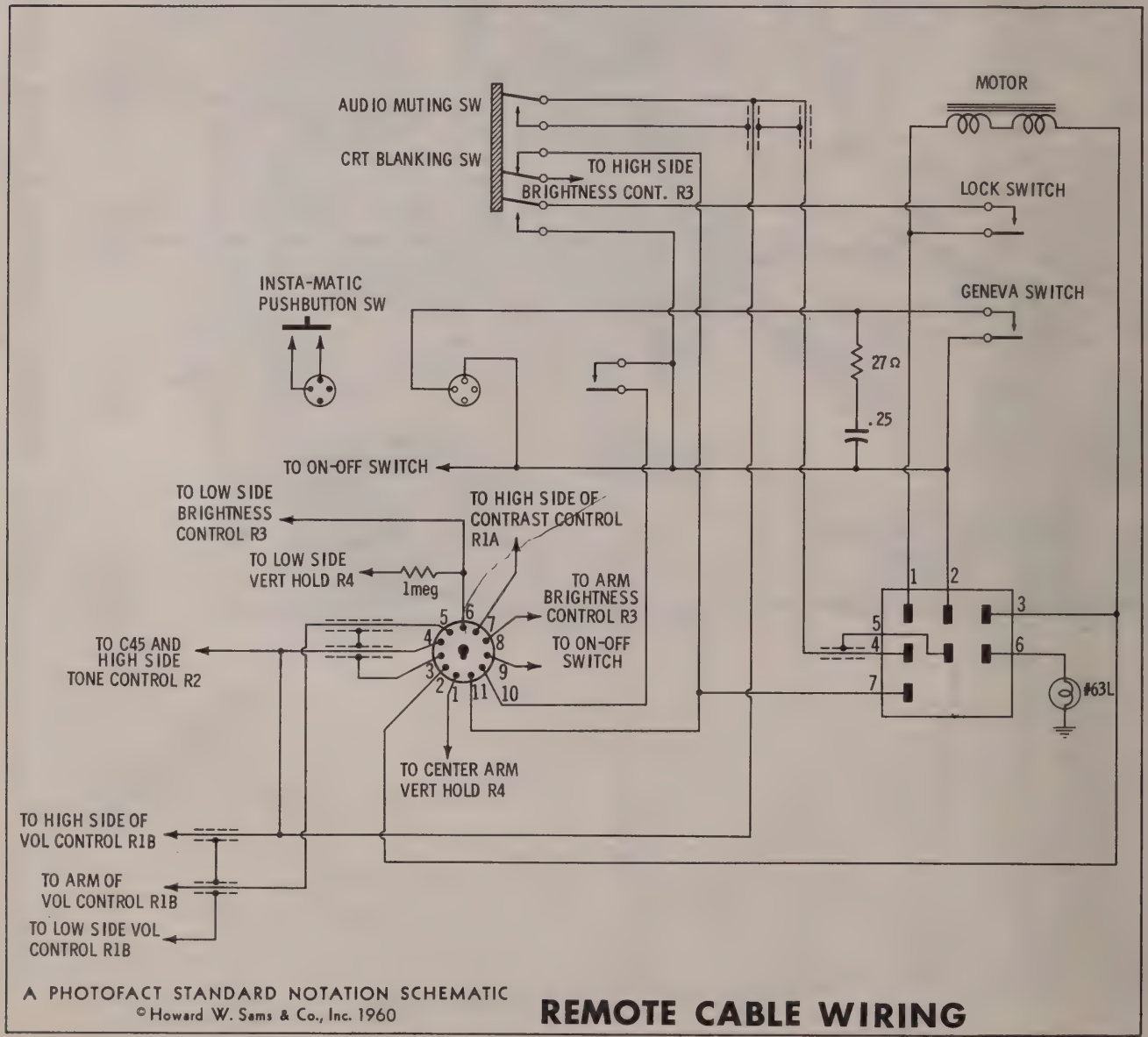
ALIGNMENT INSTRUCTIONS

REMOTE CONTROL

TR-6

REMOTE CONTROL ALIGNMENT (TR-6)

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.		Audio generator across microphone input	39.0KC		DC probe thru 100K to point Ⓐ. Common to chassis.	A1	Detune A2 by turning counterclockwise several turns. Adjust A1 for maximum deflection. Use only enough generator output to provide a usable indication on VTVM.
2.		"	"		DC probe thru 100K to point Ⓑ. Common to point Ⓒ.	A2	Increase generator output to cause overload. Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
3.		"	40KC		DC probe thru 100K to point Ⓐ. Common to chassis.	A3	Reduce generator output below overload. Adjust for maximum deflection. Peak core away from chassis.
4.		"	41.5KC		DC probe to point Ⓓ. Common to chassis.	A4	Adjust for MINIMUM deflection. Keep adjusting generator output during this adjustment so that meter reading remains between 3 and 5 volts.


AUDIO MUTING SW
CRT BLANKING SW
TO HIGH SIDE BRIGHTNESS CONT. R3
MOTOR
LOCK SWITCH
GENEVA SWITCH
INSTA-MATIC PUSHBUTTON SW
27Ω
.25
TO ON-OFF SWITCH
TO LOW SIDE BRIGHTNESS CONTROL R3
TO HIGH SIDE OF CONTRAST CONTROL R1A
TO LOW SIDE VERT HOLD R4
1meg
TO ARM BRIGHTNESS CONTROL R3
TO C45 AND HIGH SIDE TONE CONTROL R2
TO ON-OFF SWITCH
#63L
TO CENTER ARM VERT HOLD R4
TO HIGH SIDE OF VOL CONTROL R1B
TO ARM OF VOL CONTROL R1B
TO LOW SIDE VOL CONTROL R1B

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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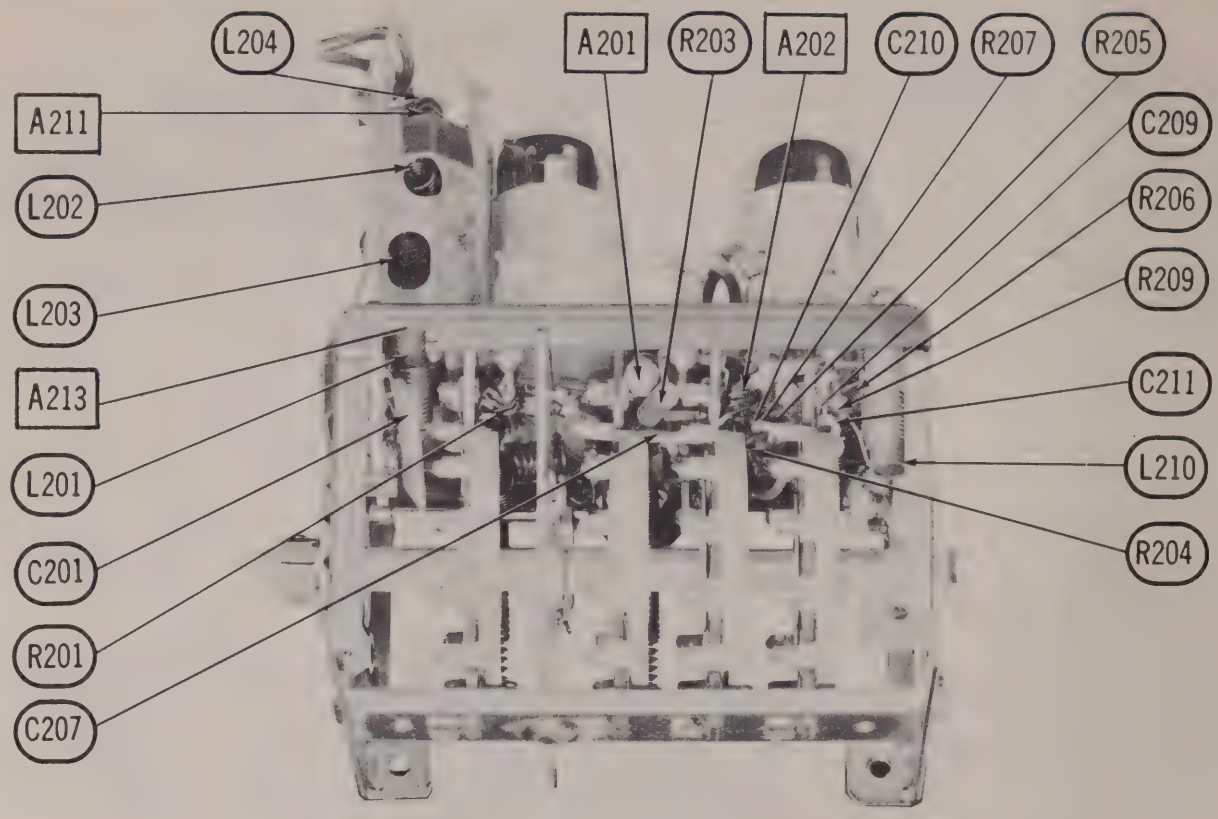
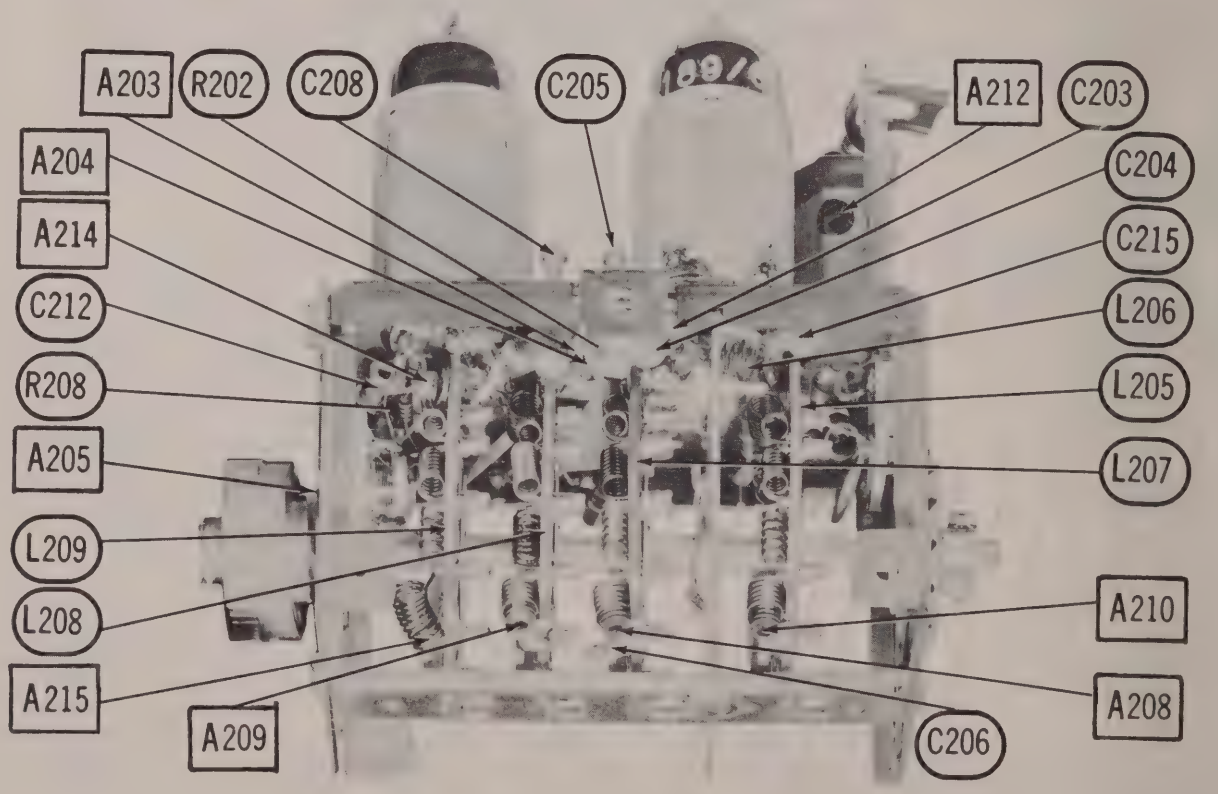
REMOTE CABLE WIRING



TUNER 1U751700 (OPTT-123) - LEFT SIDE



TUNER 1U751700 (OPTT-123) - RIGHT SIDE

TUNER ALIGNMENT INSTRUCTIONS (cont)

UHF IF ALIGNMENT

Remove the UHF Tuner from the side of the VHF Tuner so that UHF input receptacle of VHF Tuner is accessible. Coils are accessible thru opening in the side of tuner.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
13.	Fig. 203	High side thru matching network to UHF input receptacle. Low side to chassis.	44MC (10MC Swp)	41.25MC 45.75MC	UHF	Vert. Amp. thru 47K to point Ⓤ. Low side to chassis.	A216, A217	Adjust for maximum gain and symmetry of response similar to Fig. 204 with markers as shown.

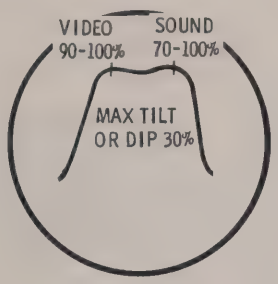


FIG. 201

FIG. 202

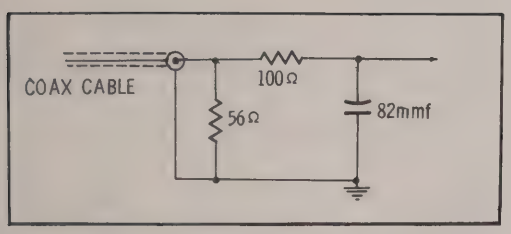


FIG. 203

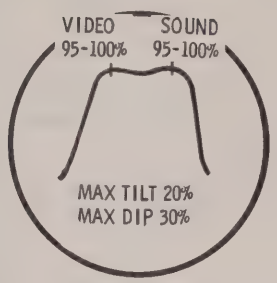
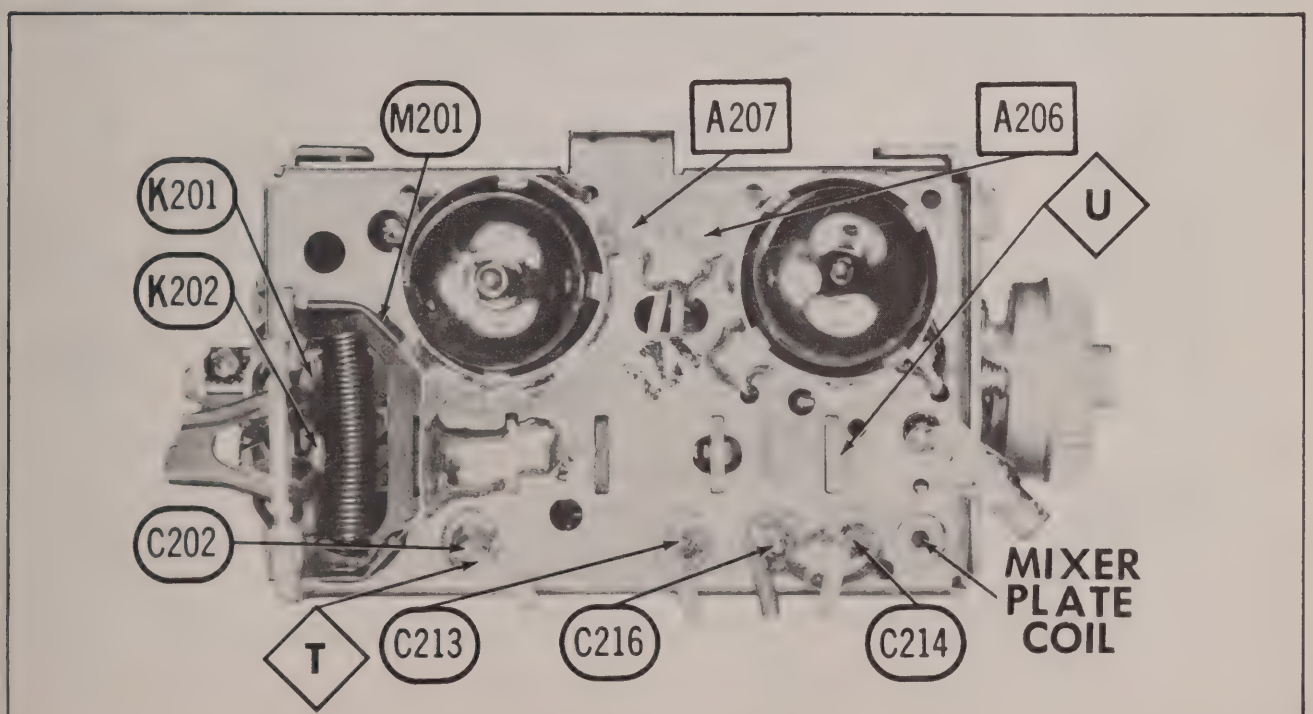


FIG. 204



TUNER 1U751700(OPTT-123) TOP VIEW

TUNER PARTS LIST AND DESCRIPTIONS

1U751700(OPTT-123)

TUBES

◆ CBS ◆ GENERAL ELECTRIC ◆ RAYTHEON ◆ SYLVANIA ◆					
ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V201	RF Amplifier	6ES8	V202	Mixer-Oscillator	6EU8

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C201A	27	#51K751641		TCZ-27	C10Q27C	CCTO-270	CNO-427	10TCC-Q27
B	15			TCZ-15	C10Q15C	CCTO-150	CNO-415	10TCC-Q15
C	6.8			TCZ-6R8	C10V68C	CCTO-6R8	CNO-568	10TCC-V68
C202	1000		EF-001	MFT-1000		CCF-102	CT280A	
C203	4.7 10%		NPO-SI 4.7	TCZ-4R7	C10V47C	CCTO-4R7	CNO-547	10TCC-V47
C204	2200		BPD-0022	DD-222	BYA10D22	CCD-222	B-222	5HK-D22
C205	.5-3			829-3		CV-1	CT565	
C206	1.5 10%		NPO-SI 1.5	TCZ-1R5	C10V15C		CNO-515	10TCC-V15
C207A	132	#51K752032		TCZ-130	L10T13			
B	15			TCZ-15	C10Q15C	CCTO-15	CNO-415	10TCC-Q15
C208	2-6			829.6		CV-3	CT552	
C209	3.9 10%	#21R128917			C10V4C			10TCC-V39
C210	680 10%		DI-680	DD-681		CCS-681	GP368	10TS-T68
C211	15 5%		NPO-SI 15	TCZ-15	C10Q15C	CCTO-150	CNO-415	10TCC-Q15
C212	5.6 N5250 5%	#21K749376				*		
C213	1000		EF-001	MFT-1000		CCF-102	CT280A	
C214	1000		EF-001	MFT-1000		CCF-102	CT280A	
C215	680 10%		DI-680	DD-681		CCS-681	GP368	10TS-T68
C216	1000		EF-001	MFT-1000		CCF-102	CT280A	

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.
\# Motorola Part Number.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R201	47K	
R202	1meg	
R203	330Ω	

ITEM No.	RATING	REMARKS
R204	15K	
R205	100K	
R206	33K	

ITEM No.	RATING	REMARKS
R207	47K	
R208	15K	
R209	2200Ω	

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	MOTOROLA PART No.	REPLACEMENT DATA
K201	40MC Filter	10mmf, 22mmf, 470K	51C747535	
K202	40MC Filter	10mmf, 22mmf, 470K	51C747535	

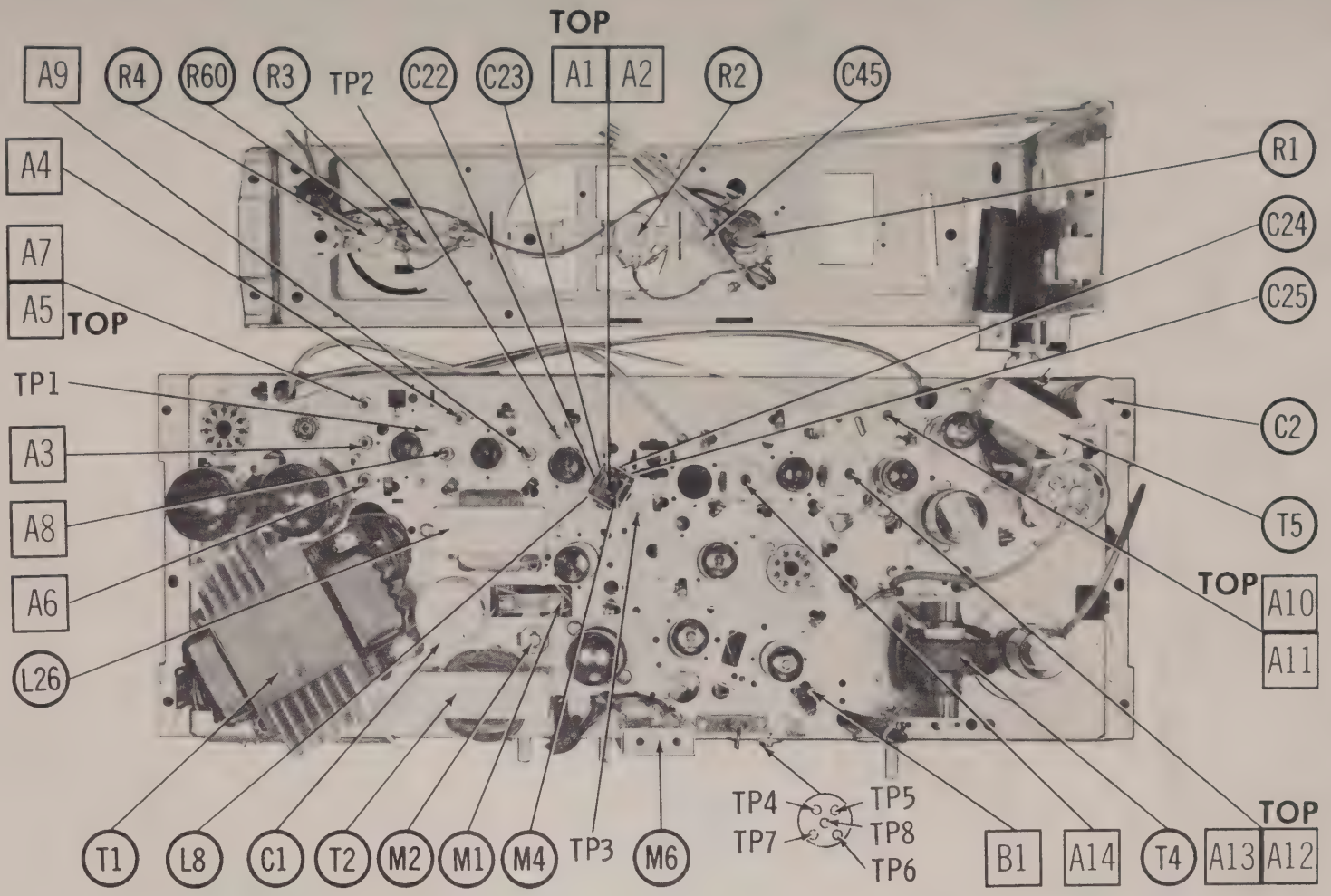
COILS (RF-IF)

ITEM No.	USE	MOTOROLA PART No.	NOTES
L201	IF Trap Coil	24K751655 †	† Part of M201.
L202	IF Trap Coil	24K751655 †	
L203	Ant. Trans.	24B749398 †	
L204	FM Trap Coil	24K752270 †	
L205	Ant. Coils	1V752397	Channels 2-13 Includes Wafer Assy.
L206	RF Choke	24K752261	

ITEM No.	USE	MOTOROLA PART No.	NOTES
L207	RF Coils	1V751663	Channels 2-13 Includes Wafer Assy.
L208	Mixer Grid Coils	1V751662	Channel 2-13 Includes Wafer Assy.
L209	Osc. Coils	1V748991	Channel 2-13 Includes Wafer Assy.
L210	Mixer Plate Coil	24B747838	

MISCELLANEOUS

ITEM No.	PART NAME	MOTOROLA PART No.	NOTES
M201	Hi Pass Filter	1V751664	Assembly
	Shaft	1B752100	Fine Tuning, Includes Driver Gear
	Shaft	47K752075	VHF Channel Selector
	Idler Gears & Shaft	1A752394	Assembly

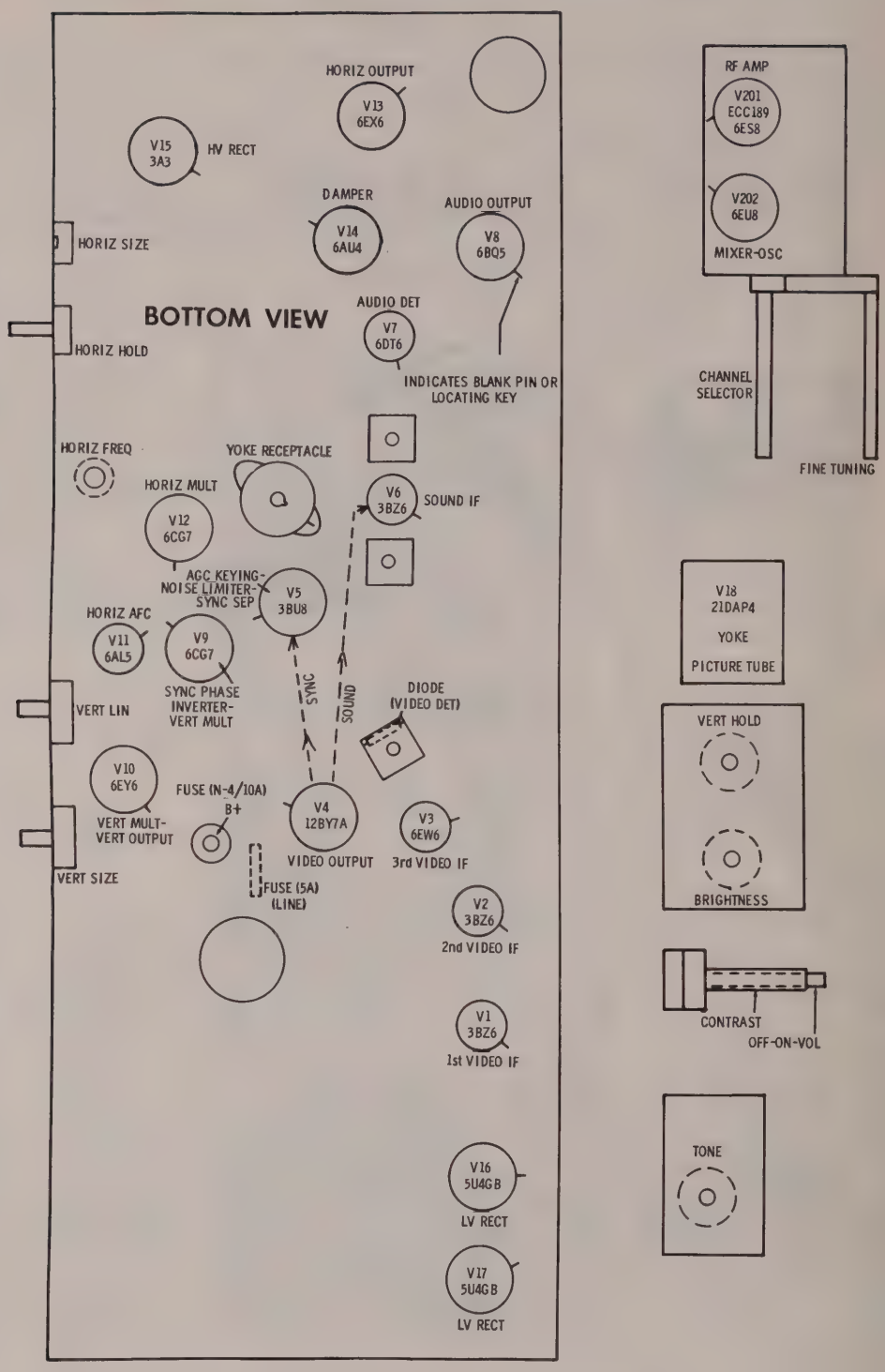


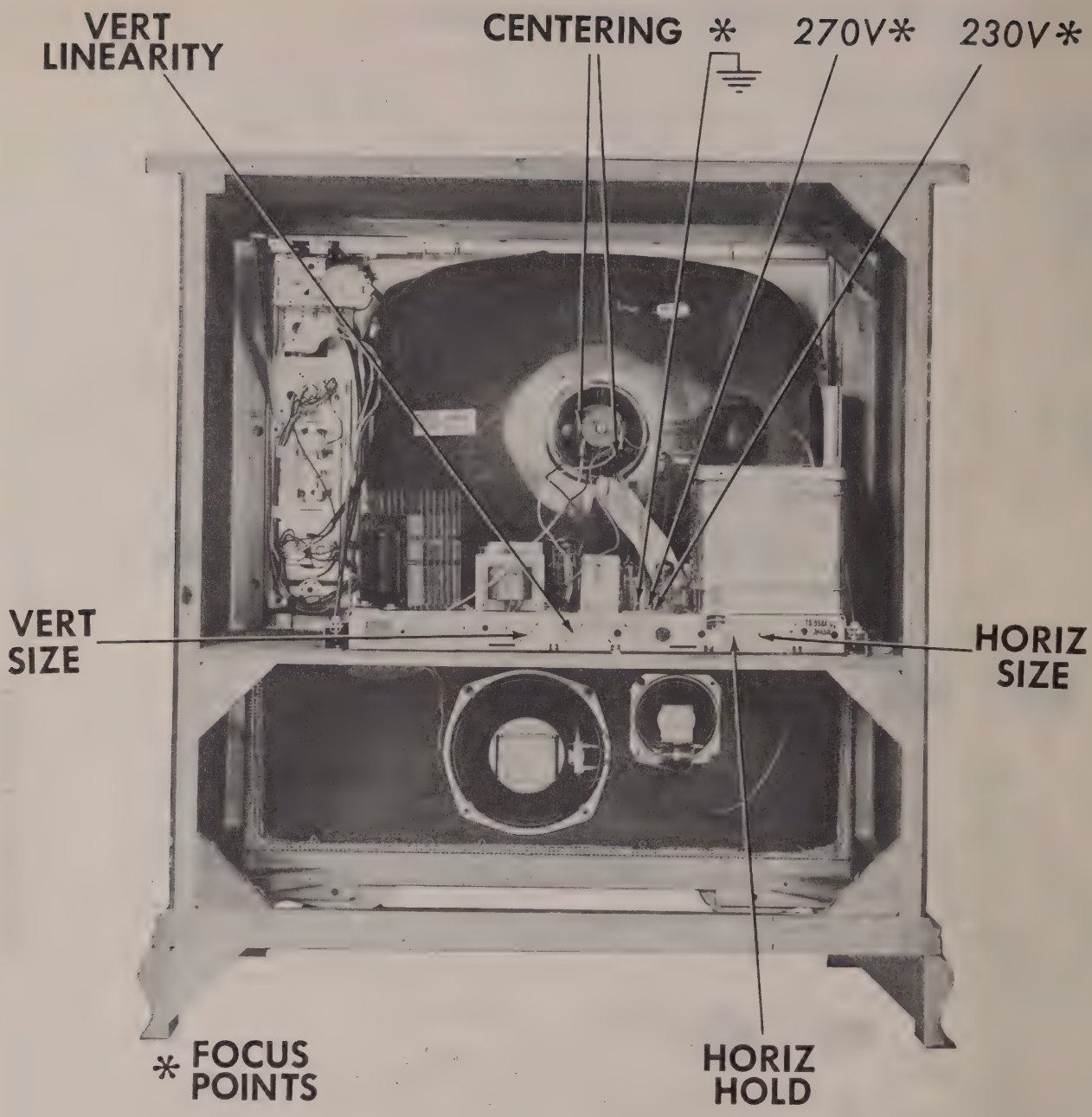
TP1	125V	1st VIDEO IF SCREEN	TP5	265V	HORIZ MULT
TP2	0V	3rd VIDEO IF GRID	TP6	0V	GROUND
TP3	-1.7V	VIDEO OUTPUT	TP7	.8V	HORIZ AFC
TP4	-.45V	IF AGC	TP8	270V	B+

CHASSIS-TOP VIEW

MOTOROLA CHASSIS TS-558, TS-558Y, WTS-558

TUBE PLACEMENT CHART





CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably with a test pattern. Adjust the Brightness and Contrast controls for a normal picture.

Short out the AFC voltage by connecting a clip lead from TP-7 to chassis. Connect a .1mfd, 400 volt capacitor from TP-5 to chassis.

Adjust Horizontal Hold to the point where the picture is almost stable horizontally.

Remove the capacitor from TP-7 and adjust the Horizontal Frequency slug (B1) to the point where the picture is almost stable horizontally.

Remove the clip lead from TP-7 and chassis. Adjust the Horizontal Hold control until the picture is synchronized horizontally.

Adjust the Horizontal Size (R8) for a picture slightly wider than necessary to fill the picture mask horizontally.

PHOTOFACT® Folder

EIA MEMBER

PRODUCTION CHANGE BULLETIN 232

SUPPLEMENTAL DATA TO PHOTOFACT FOLDER 3 IN SET 447

Sylvania Models 17D203Q, QU, 17D303S, SU, T, TU (Ch. 1-543-1, -2) were covered in PHOTOFACT Folder 3 - Set 447.

Models 17D12 Series (Ch. 1-543-3, -4) are added along with late production changes, with the publication of this bulletin.

Ch. 1-543-1, -2 Code 05

COMPONENTS ADDED

Two 3.3meg ½ Watt resistors are added in parallel from the 300K stop on the Vertical Linearity Control to ground.

Ch. 1-543-1, -2 Code 06

COMPONENT CHANGE

M1 (dual Germanium Rectifier) is replaced with two single Silicon Rectifier units (Part #517-0021).

Ch. 1-543-1, -2 Code 07

COMPONENTS ADDED

A 22Ω 1 Watt resistor is added from pin 8 of the Horizontal Output Tube (12DQ6A) to ground.

A .5Ω resistor-coil combination is added from pin 7 of the high voltage rectifier tube (1B3GT) to R77.

COMPONENT CHANGES

R75 is increased from 12K to 15K.

R5 (Vertical Linearity Control) stop is decreased from 300K to 250K.

The two 3.3meg ½ Watt resistors that were previously added in Code 05 are omitted.

SYLVANIA MODELS 17D12 SERIES (CH. 1-543-3, -4)

(Continued on Reverse Side)

SUPPLEMENTAL DATA TO PHOTOFACT FOLDER 16 IN SET367

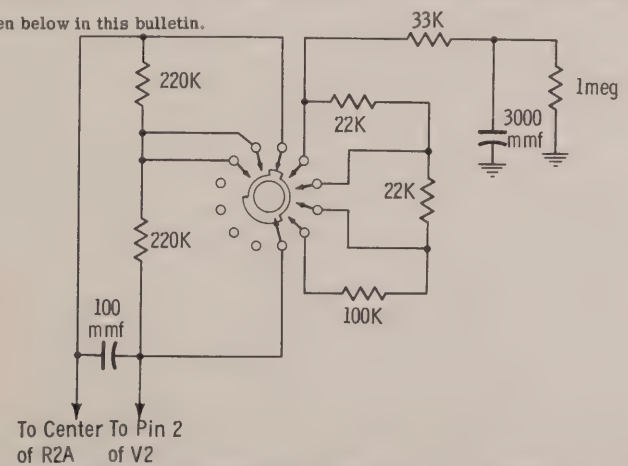
Pilot Model AA-920A was covered in PHOTOFACT Folder 16 - Set 376.

Model AA-920B is electrically identical except for the following changes.

COMPONENT CHANGES

R1 (Loudness Control) is omitted.

A wafer type Loudness Control and switch is added. A partial schematic showing this added switch is given below in this bulletin.



PILOT MODEL AA-920B

PRODUCTION CHANGE BULLETIN 232

PRODUCTION CHANGE BULLETIN 232

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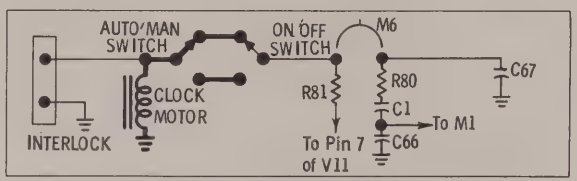
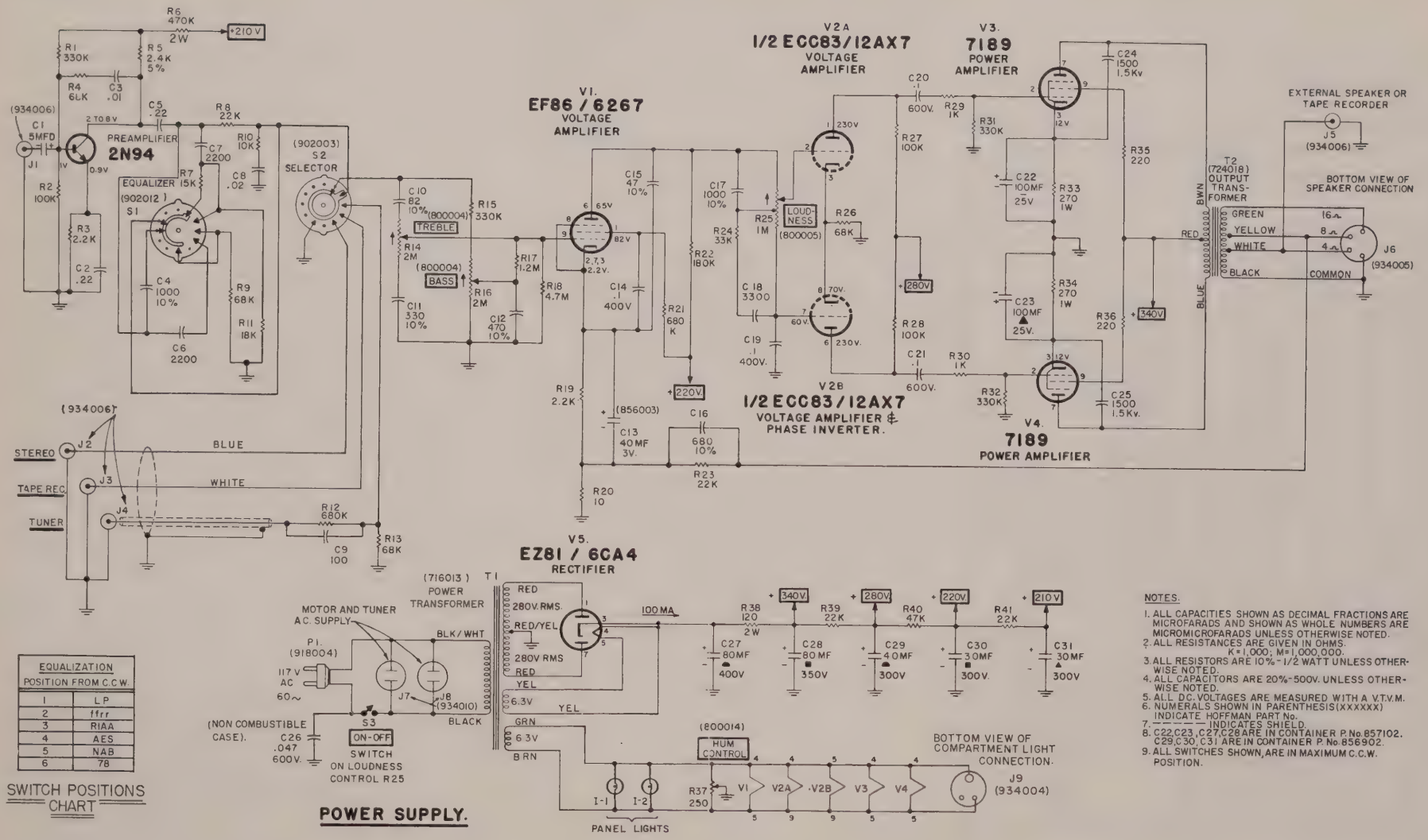
Ch. 1-543-1, -2 Code 08	COMPONENT CHANGE The two single Silicon Rectifier units are replaced with a single dual Germanium Rectifier.
Ch. 1-543-1, -2 Code 09	COMPONENT CHANGE R51 is decreased from 1.2meg to 1meg.
Models 17D12 Series (Ch. 1-543-3, -4)	The 1-543-3, -4 chassis is electrically identical to the 1-543-1, -2 chassis except for the following changes. The 1-543-3, -4 chassis incorporates an automatic clock timer. A partial schematic of the clock timer circuit is given in this bulletin. 

SUPPLEMENTAL DATA TO PHOTOFACT FOLDER 9 IN SET 408		HOFFMAN MODELS B8003, M8003, SP8003 (CH. 1121, 1124)
	Hoffman Models B802, M802, SP802, W802, B8002, M8002, SP8002, W8002 (Ch. 1108, 1116) were covered in PHOTOFACT Folder 9 - Set 408. Models B8003, M8003, SP8003 (Ch. 1121, 1124) are electrically identical except for the following changes.	
Ch. 1121	PREAMPLIFIER ADDED The 1121 chassis is similar to the 1108 chassis except a transistor preamplifier is added. A schematic diagram showing the preamplifier circuit and other changes incorporated is given in this bulletin on the reverse side.	
Ch. 1124	COMPONENTS ADDED A 12mmf capacitor is added from one side of the primary of L1 (FM Ant. Trans.) to ground. A 47K ½ Watt resistor is added between R20 and lug 4 of M4 (AM-FM Stereo Switch). An .01mfd capacitor is added from pin 6 of V4 (6BE6) to ground. COMPONENTS CHANGED C27, C28, C29 are decreased from 300mmf to 270mmf. The AM-FM Selector Switch (M4) part number is changed to 902013. The Power Transformer (T1) part number is changed to 716014.	



EQUALIZATION POSITION FROM C.C.W.	
1	LP
2	ffrr
3	RIAA
4	AES
5	NAB
6	78

SWITCH POSITIONS CHART

POWER SUPPLY.

NOTES.

1. ALL CAPACITIES SHOWN AS DECIMAL FRACTIONS ARE MICROFARADS AND SHOWN AS WHOLE NUMBERS ARE MICROMICROFARADS UNLESS OTHERWISE NOTED.
2. ALL RESISTANCES ARE GIVEN IN OHMS. K=1,000; M=1,000,000.
3. ALL RESISTORS ARE 10%-1/2 WATT UNLESS OTHERWISE NOTED.
4. ALL CAPACITORS ARE 20%-500V. UNLESS OTHERWISE NOTED.
5. ALL DC VOLTAGES ARE MEASURED WITH A V.T.V.M.
6. NUMERALS SHOWN IN PARENTHESIS(XXXXXX) INDICATE HOFFMAN PART No.
7. ------ INDICATES SHIELD.
8. C22,C23,C27,C28 ARE IN CONTAINER P.No.857102. C29,C30,C31 ARE IN CONTAINER P. No.856902.
9. ALL SWITCHES SHOWN, ARE IN MAXIMUM C.C.W. POSITION.

HOFFMAN MODELS B8003, M8003, SP8003 (Ch. 1121, 1124)

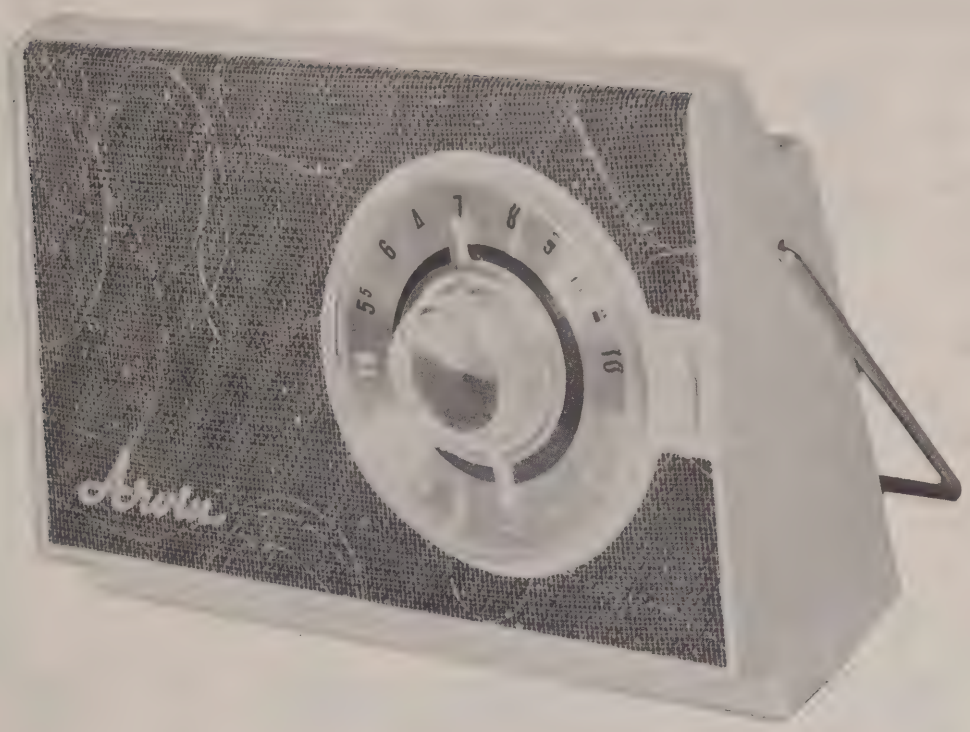
Schematic Diagram Courtesy of Hoffman Electronics Corp.

PHOTOFACT® Folder with CIRCUITRACE®

EIA

ARVIN MODEL
9595 (Ch. 1.47600)

ARVIN MODEL
9595 (Ch. 1.47600)



ARVIN MODEL
9595 (Ch. 1.47600)

TRADE NAME	Arvin Model 9595 (Ch. 1.47600)
MANUFACTURER	Arvin Industries, Inc., Columbus, Indiana
TYPE SET	Battery Operated Transistorized Portable AM Receiver
POWER SUPPLY	6 Volts DC
TUNING RANGE—BROADCAST	540 - 1670KC
RATING	5.2MA@6 Volts DC (No Signal, Min. Volume) 9 MA@6 Volts DC (Signal, Normal Volume)

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested alignment tools:

A1, A2, A3..... GENERAL CEMENT #8607, 9291
WALSCO #2520, 2522, 2523, 2524, 2537

A4, A6..... GENERAL CEMENT #5004, 5008, 5009
WALSCO #2520

A5..... GENERAL CEMENT #8606, 8606L, 8282, 9295
WALSCO #2526, 2543, 2544, 2545

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.05mfd	High side to antenna lug of tuning gang. Low side to chassis.	455KC (400~ Mod.)	Tuning gang fully open.	Across voice coil.	A1, A2, A3	Adjust for maximum output.
2.		Loop	1670KC	"	"	A4	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		"	600KC	600KC	"	A5	"
4.		"	1400KC	Tune to 1400KC Signal	"	A6	Adjust for maximum output while rocking tuning gang.

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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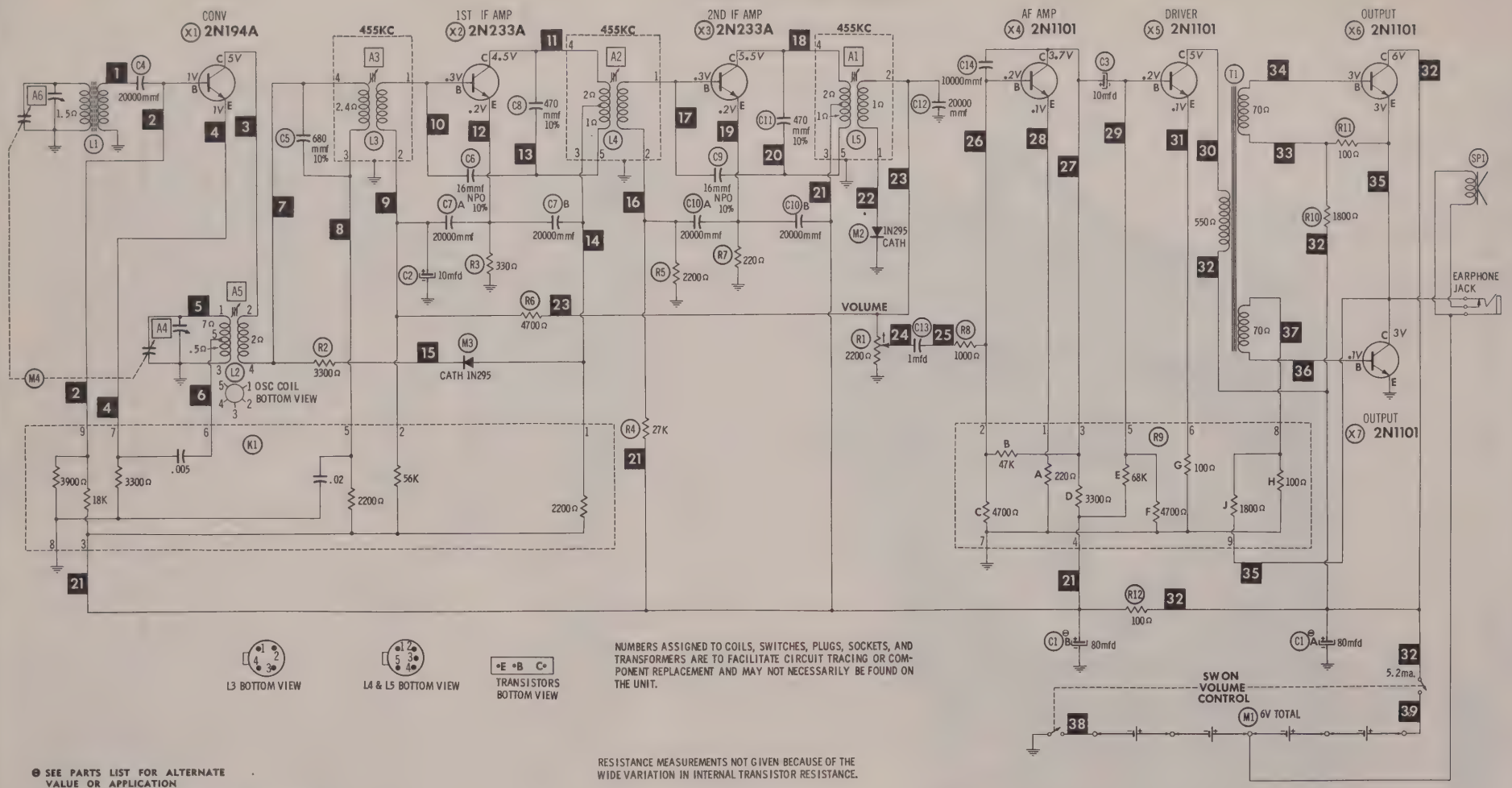
JF 447



NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

RESISTANCE MEASUREMENTS NOT GIVEN BECAUSE OF THE WIDE VARIATION IN INTERNAL TRANSISTOR RESISTANCE.

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

1. DC voltage measurements taken with vacuum tube voltmeter.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
5. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC with CIRCUITRACE®

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ARVIN MODEL 9595 (Ch. 1.47600)

PARTS LIST AND DESCRIPTIONS

WIRING DATA

General-use Unshielded Hook-up Wire .....Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA				NOTES
			CBS PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	2N194A	Converter	2N306			2N194	NPN
X2	2N233A	1st IF Amplifier	2N306			2N233A	NPN
X3	2N233A	2nd IF Amplifier	2N306			2N233A	NPN
X4	2N1101	AF Amplifier	2N306			2N1101	NPN
X5	2N1101	Driver	2N306			2N1101	NPN
X6	2N1101	Output	2N306			2N1101	NPN } Matched
X7	2N1101	Output	2N306			2N1101	NPN } Pair

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	ARVIN PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1A	80	10	44396-2①	BCD10X8080		PETA2385		VL-2350	
B	80	10							
C2	10	10	44396-4	PWE10010	EC10-10	TT12X10	ML10-15	TE-1114	
C3	10	10	44396-4	PWE10010	EC10-10	TT12X10	ML10-15	TE-1114	

① Part #44397-3 may be used in some versions.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C4	20000		BPD-02	DD-203	BYB6S2		B-120	5HK-S20
C5	680 10%		ADM-19-681-10%	DD-681	1R5T68	DM-15-681K	MCJ249	MS-368
C6	16 NPO 10%		NPO-DI 15	DTZ-15	C10Q15C		CNO-415	10TCC-Q15
C7A	20000		BPD-2X02	DA-203	BYB6S2		B-120	5HK-2S20
B	20000			DA-203	BYB6S2		B-120	
C8	470 10%		ADM-15-471-10%	DD-471	22R5T47	DM-15-471K	MCJ244	MS-347
C9	16 NPO 10%		NPO-DI 15	DTZ-15	C10Q15C		CNO-415	10TCC-Q15
C10A	20000		BPD-2X02	DA-203	BYB6S2		B-120	5HK-2S20
B	20000			DA-203	BYB6S2		B-120	
C11	470		ADM-15-471-10%	DD-471	22R5T47		MCJ244	MS347
C12	20000		BPD-02	DA-203	BYB6S2		B-120	5HK-S2
C13	1mfd		P282Z-1.0	UK-105	MP2W1			118P10502S2
C14	10000		BPD-01	DD-103	BYA10S1		B-110	5HK-S10

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	ARVIN PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1	2200Ω	.2	46800-1					Volume & Switch

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R2	3300Ω	
R3	330Ω	
R4	27K	
R5	2200Ω	
R6	4700Ω	
R7	220Ω	
R8	1000Ω	

ITEM No.	RATING	REMARKS
R9A	220Ω	#46000-5
B	47K	
C	4700Ω	
D	3300Ω	
E	68K	
F	4700Ω	
G	100Ω	

ITEM No.	RATING	REMARKS
R9 H	100Ω	
I	18000Ω	
R10	18000Ω	
R11	100Ω	
R12	100Ω	

Arvin Part Number.

PRINTED BOARD

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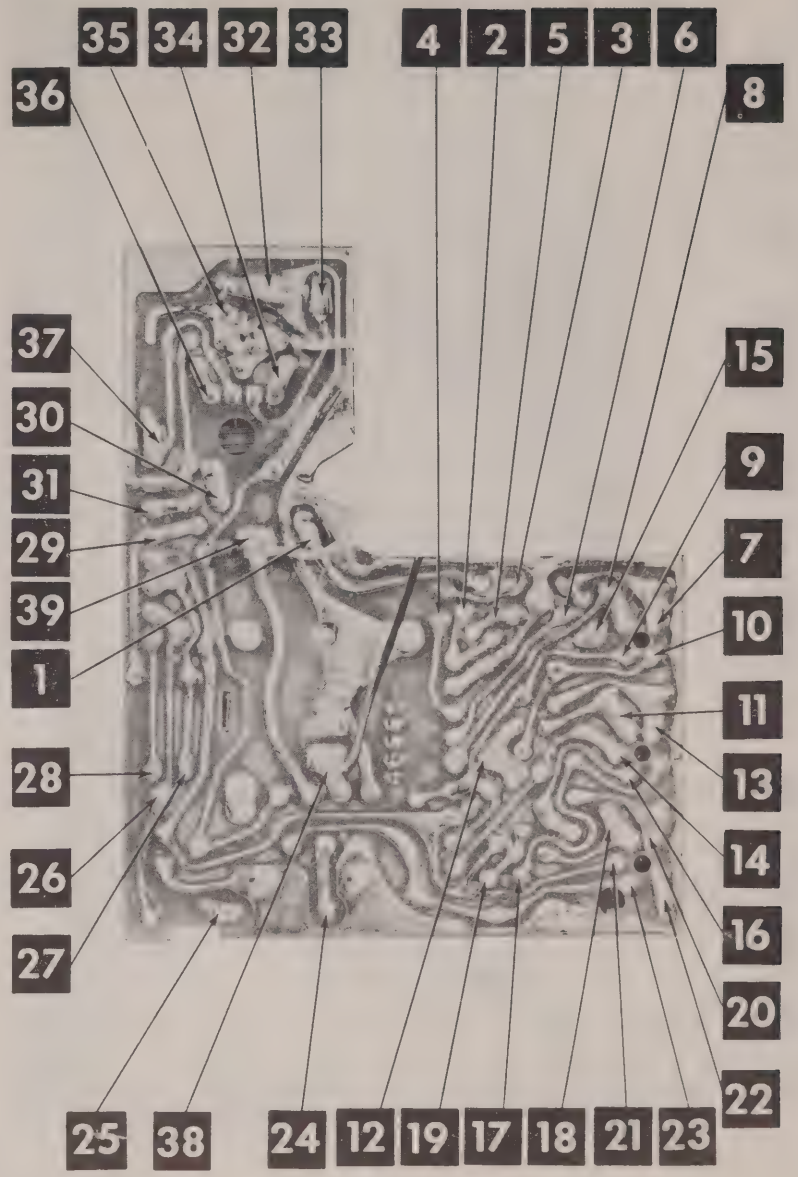


ARVIN MODEL
9595 (Ch. 1.47600)

FOLDER 4

PARTS LIST AND DESCRIPTIONS (Continued)

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	ARVIN PART No.	REPLACEMENT DATA
K1	Converter IF Amp. Network	.005mfd, .02mfd, 2200Ω, 2200Ω, 3300Ω, 3900Ω, 18K, 56K	46000-4	

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		ARVIN PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	Loopstick	45534-13						
L2	Osc. Coil	45783-9						
L3	1st IF Trans.	44855-12						
L4	2nd IF Trans.	44855-13						
L5	3rd IF Trans.	44855-14						

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA						NOTES
	PRI.	SEC.1	ARVIN PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	3	1	45604-3						
		SEC. 2							
		1							

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	ARVIN PART No.	QUAM PART No.	
SP1	3½"	PM	44-46Ω	46523-2		

BATTERIES

ITEM No.	VOLTAGE	ARVIN PART No.	REPLACEMENT DATA						NOTES
			BURGESS		EVEREADY		MALLORY		
			"A"	"B"	"A"	"B"	"A"	"B"	
M1	1.5V			230		A100		M-13R	4 Required

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA				NOTES
		ARVIN PART No.	CBS PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
M2	1N295	43959	1N60	1N295	1N295	Detector (Pigtail)
M3	1N295	43959	1N60	1N295	1N295	AGC (Pigtail)

MISCELLANEOUS

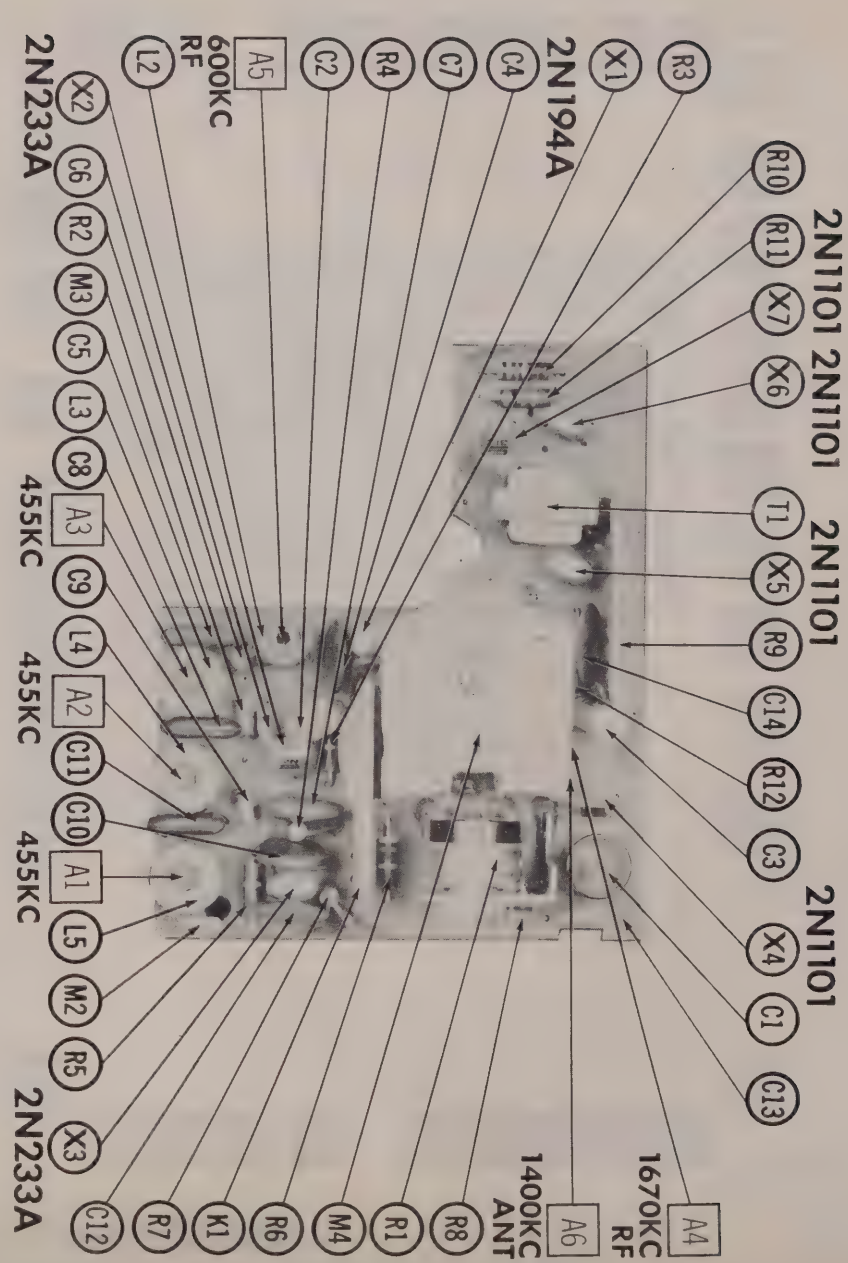
ITEM No.	PART NAME	ARVIN PART No.	NOTES
M4	Tuning Cap	47424	2 Gang

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

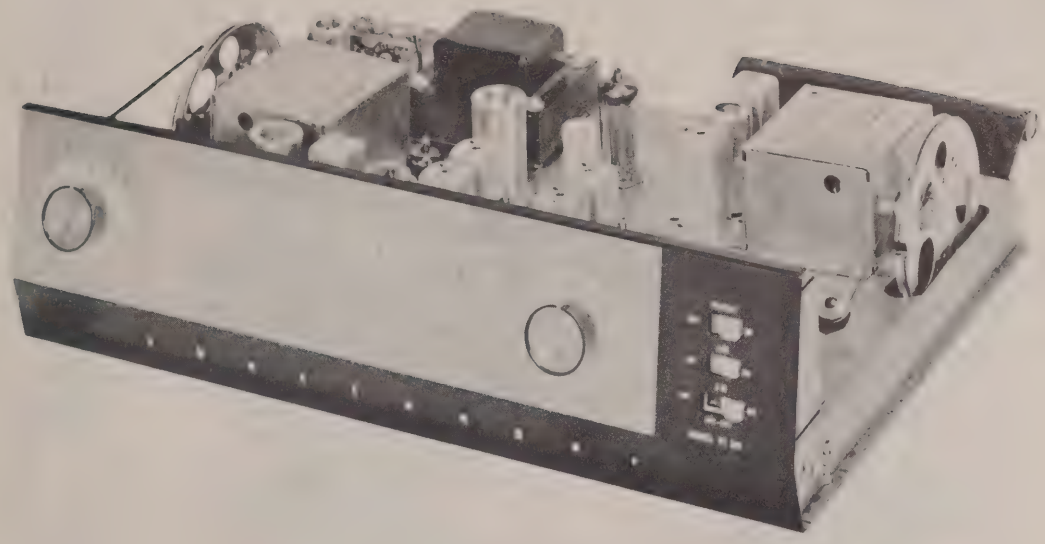
NAME	PART NO.	DESCRIPTION
Knob	46659	Tuning
Knob	46807	Station Indicator
Knob	46658-67	Off-On-Volume, White
Knob	46658-59	Off-On-Volume, Gray
Knob	46658-19	Off-On-Volume, Charcoal
Cabinet Front Ass'y.	AA47461-67	White, Includes Grille Insert & Dial Scale
Cabinet Front Ass'y.	AA47461-59	Gray, Includes Grille Insert & Dial Scale
Cabinet Front Ass'y.	AA47461-19	Charcoal, Includes Grille Insert & Dial Scale
Cabinet Back	46611-67	White
Cabinet Back	44611-59	Gray
Cabinet Back	44611-19	Charcoal
Handle	46692-1	Chrome

CHASSIS—TOP VIEW



PHOTOFACT® Folder

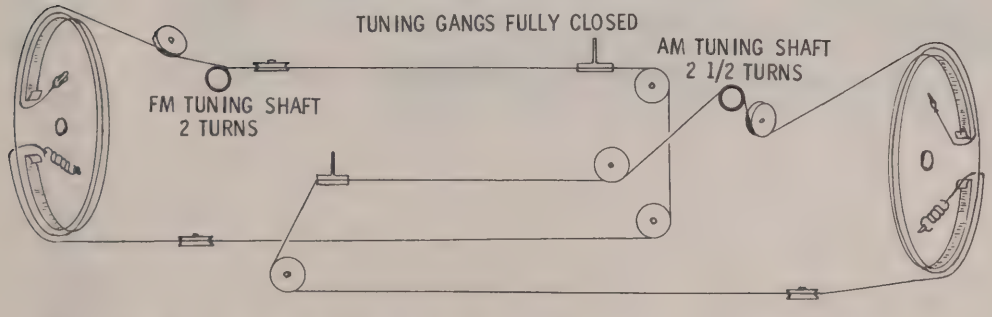
CHALLENGER
MODEL TC200A



CHALLENGER
MODEL TC200A

TRADE NAME	Challenger Model TC200A		
MANUFACTURER	Challenger Amplifier Co., P. O. Box 500, Paramus, N. J.		
TYPE SET	AC Operated 8 Tube FM-AM Tuner		
POWER SUPPLY	110-120 Volts AC, 60 Cycles	RATING	38 Watts, .4 Amp. @117 Volts AC(AM-FM-ON)
TUNING RANGE—BROADCAST	520-1640KC	FREQ. MOD.	88 - 108MC

DIAL CORD STRINGING



HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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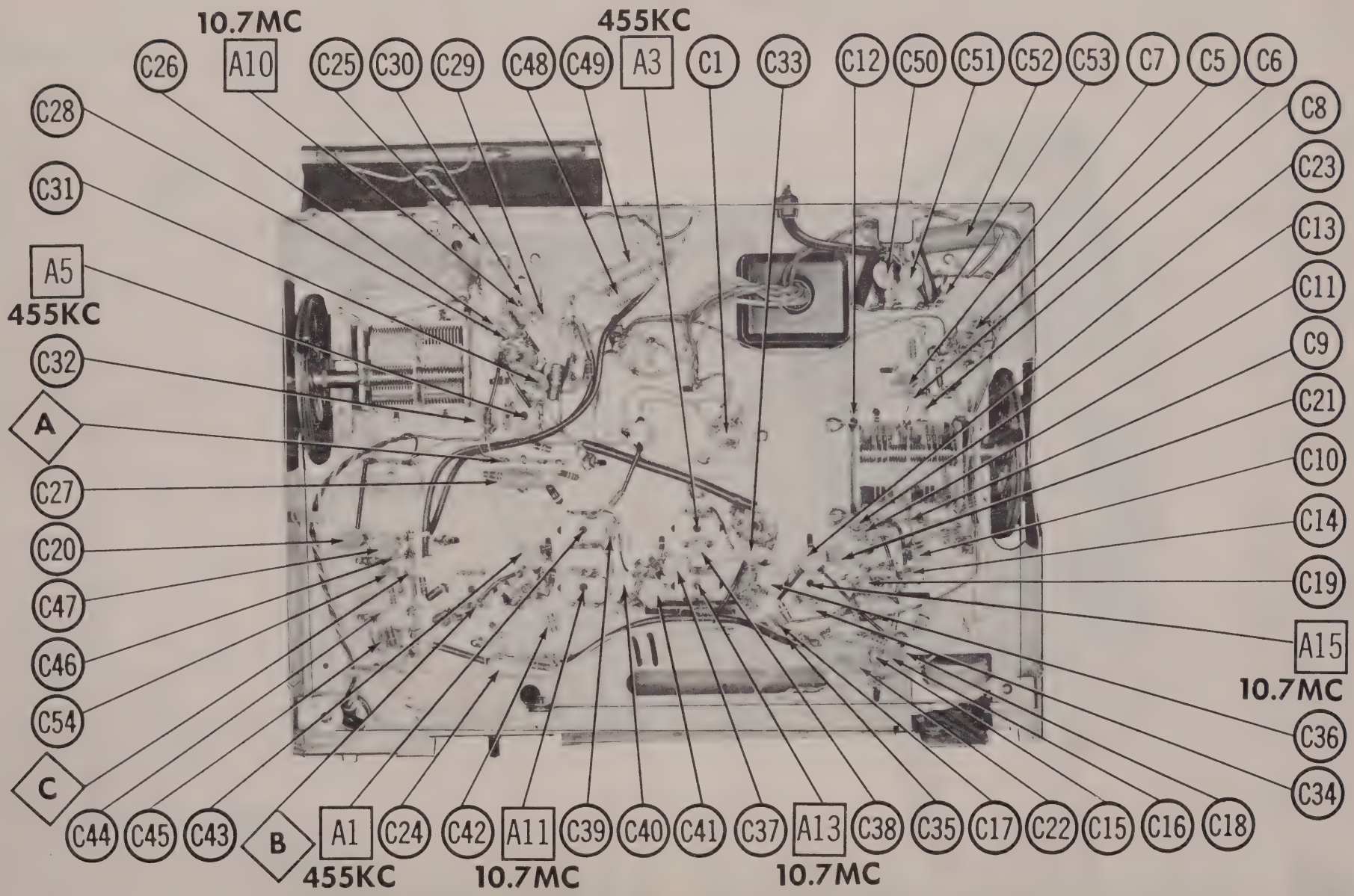
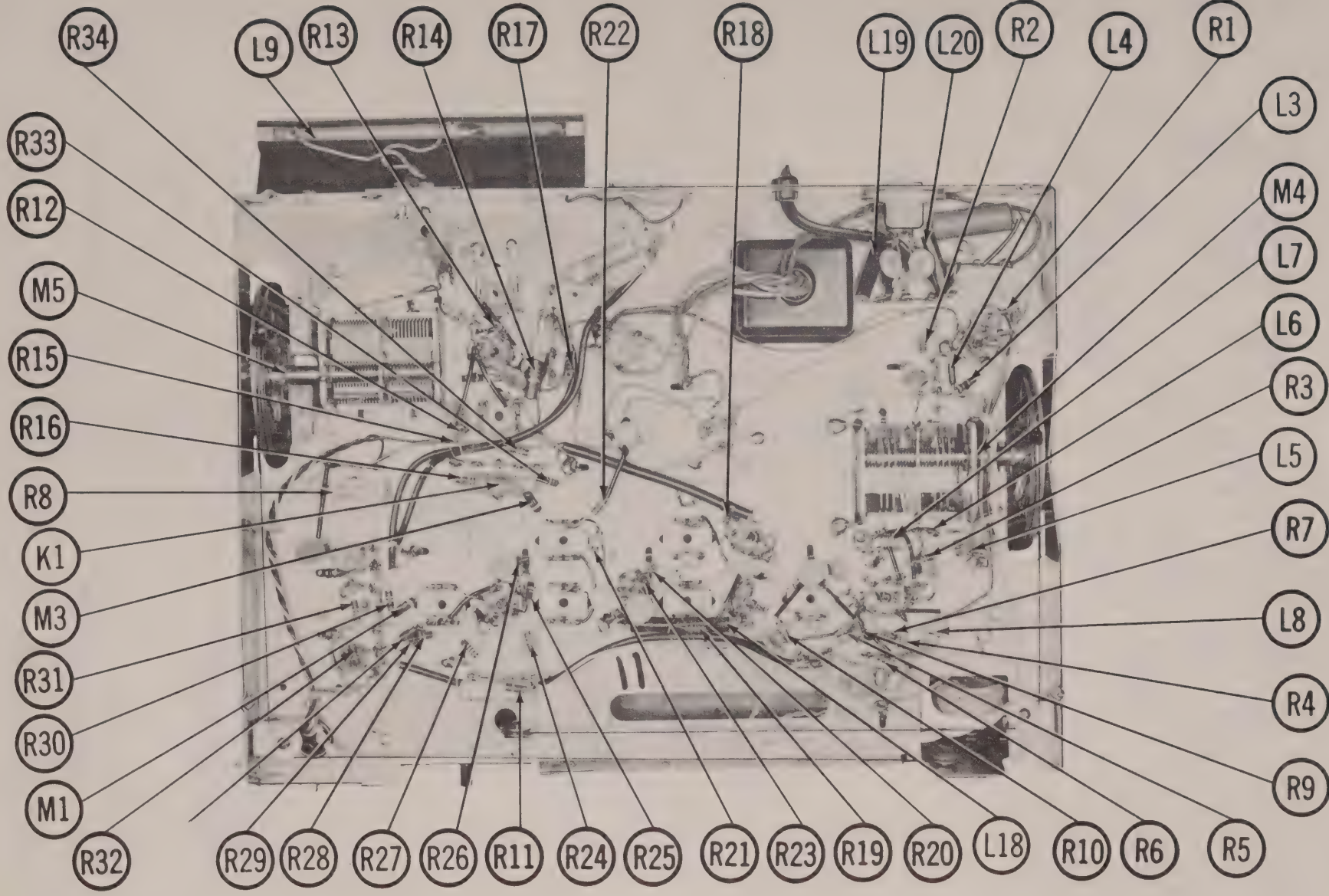
JL411

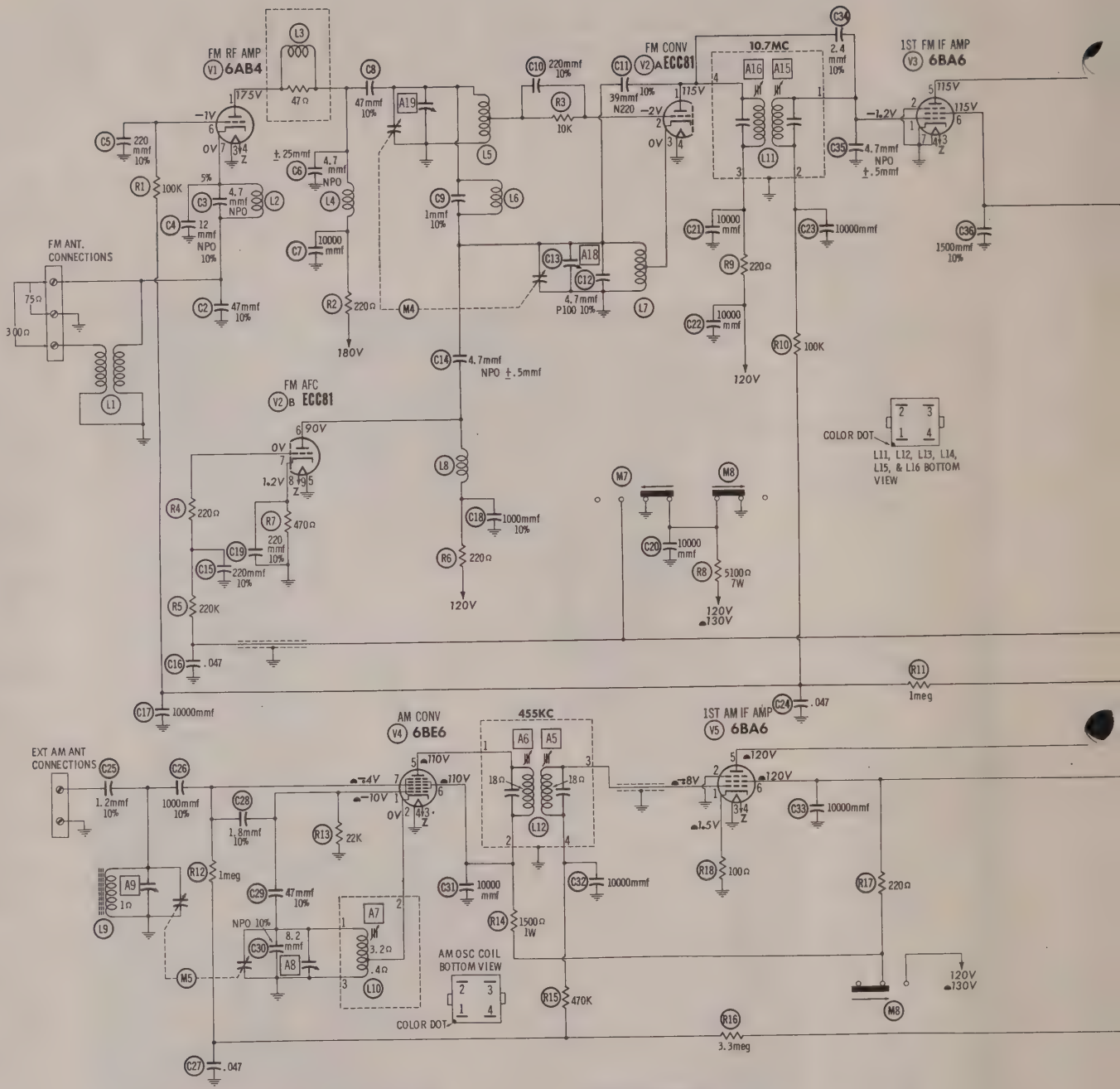
SET 470 FOLDER 5



CHASSIS BOTTOM VIEW — ALIGNMENT & CAPACITOR IDENT.



CHASSIS BOTTOM VIEW – RESISTOR, INDUCTOR & MISC. IDENT.



1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. No signal applied for voltage measurements.

Θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6AB4	†720Ω	0Ω	0Ω	.1Ω	0Ω	1.3meg	.1Ω		
V2	ECC81 12AT7	†1700Ω	10K	0Ω	0Ω	0Ω	†1700Ω	1.4meg ▪220K	470Ω	.1Ω
V3	6BA6	1.3meg	0Ω	.1Ω	0Ω	†1700Ω	†1700Ω	0Ω		
V4	6BE6	▲22K	▲.4Ω	.1Ω	0Ω	†▲3000Ω	†▲3000Ω	▲4.6meg		
V5	6BA6	▲3.9meg	0Ω	0Ω	.1Ω	†▲1700Ω	†▲1700Ω	▲100Ω		
V6	6AU6	120K	0Ω	.1Ω	0Ω	†1700Ω	†1700Ω	150Ω		
V7	6AU6	100K	0Ω	.1Ω	0Ω	†17K	†17K	0Ω		
V8	EZ80	160Ω	NC	¶	0Ω	.1Ω	NC	150Ω	NC	NC

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT. ALL MEASUREMENTS TAKEN IN "FM" POSITION UNLESS OTHERWISE DESIGNATED.

† MEASURED FROM PIN 3 OF V8.

▲ MEASURED IN "AM" POSITION.

NC NO CONNECTION

▪ MEASURED IN "FM-AFC" POSITION

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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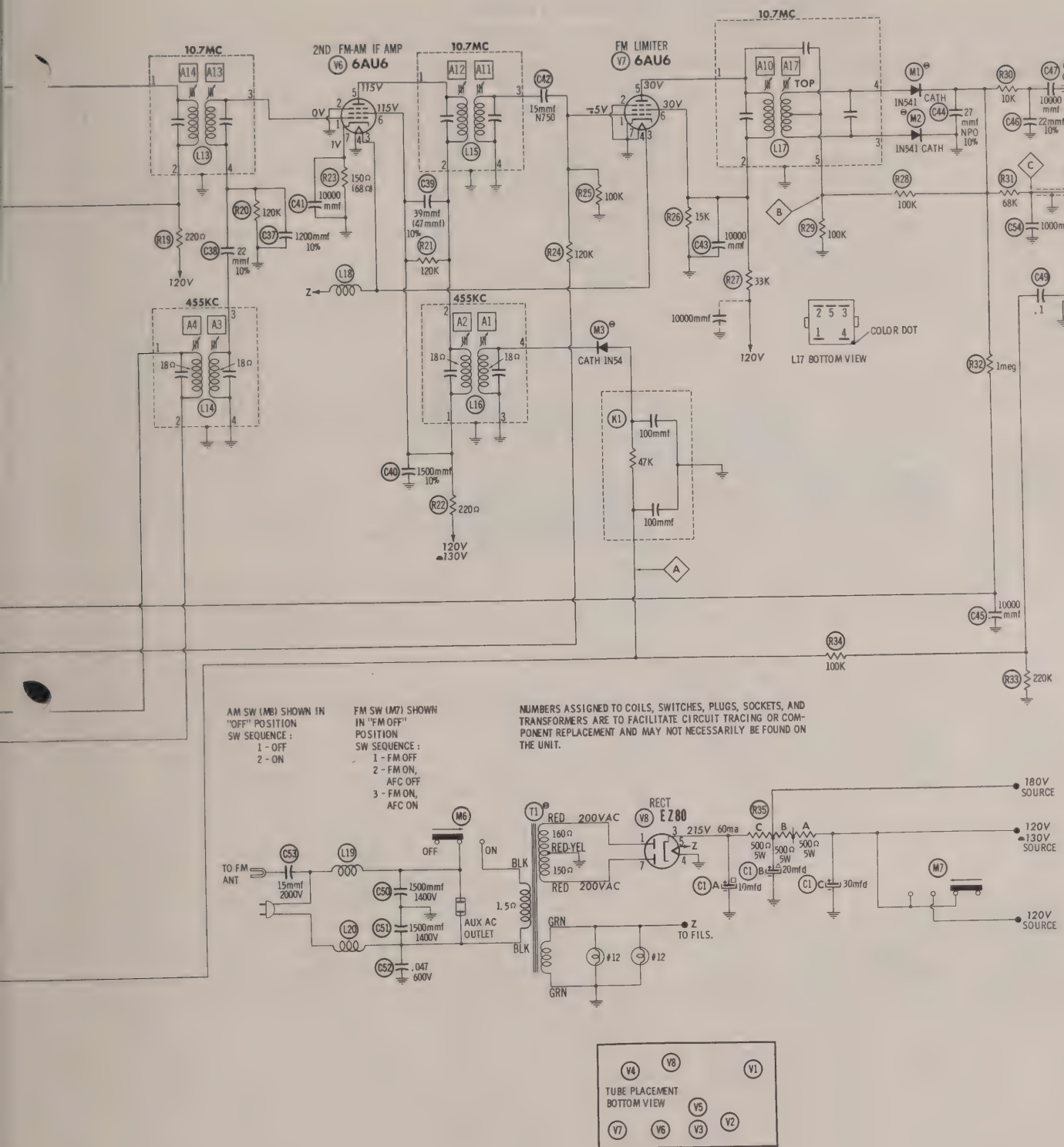


CHALLENGER
MODEL TC200A

CHALLENGER
MODEL TC200A

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested alignment tools:

A1 thru A6, A10 thru A14, A17	GENERAL CEMENT #5097, 8727 WALSCO #2515
A7	GENERAL CEMENT #8606, 8606L, 8282, 9295 WALSCO #2526, 2543, 2544, 2545
A8, A9, A19	GENERAL CEMENT #5004, 5008, 5009 WALSCO #2520
A15, A16	GENERAL CEMENT #5009, 8195, 8274, 8275, 8728, 8987 WALSCO #2531
A18	GENERAL CEMENT #8721, 8722 WALSCO #2519

AM ALIGNMENT

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1.	High side thru .01mfd to pin 7 (grid) of AM Converter. Low side to chassis.	455KC (400∿ Mod.)	AM	High freq. end.	DC probe thru 10K to point Ⓐ. Common to chassis.	A1, A2, A3, A4, A5, A6	Adjust for maximum deflection.
2.	"	600KC	"	600KC	"	A7	"
3	"	1500KC	"	1500KC	"	A8, A9	Adjust for maximum deflection. Repeat Steps 2 and 3.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
4.	High side thru .01mfd to pin 2 (grid) of FM Mixer. Low side to chassis.	10.7MC (Unmod.)	FM (AFC OUT)	Point of non-interference.	DC probe thru 100K to point Ⓑ. Common to chassis.	A10, A11 A12, A13 A14, A15 A16	Adjust for maximum deflection.
5.	"	"	"	"	DC probe thru 100K to point Ⓒ. Common to chassis.	A17	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
4.	High side thru .01mfd to pin 2 (grid) of FM Mixer. Low side to chassis.	10.7MC (450KC Swp)	FM (AFC Out)	Point of non-interference	Vert. amp. thru 100K to point Ⓑ. Low side to chassis.	A10, A11, A12, A13, A14, A15, A16	Adjust for maximum gain and symmetry similar to Fig. 1.
5.	"	"	"	"	Vert. amp. thru 100K to point Ⓒ. Low side to chassis.	A17	Adjust to place marker at the center of crossover lines similar to Fig. 2. SLIGHTLY retouch A10 for maximum amplitude and straightness of crossover lines.

FM RF ALIGNMENT

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
6.	Thru dummy (Fig. 3) to FM antenna terminals.	104MC (Unmod.)	FM (AFC OFF)	104MC	DC probe thru 100K to point Ⓑ. Common to chassis.	A18, A19	Adjust for maximum deflection.
7.	"	90MC	"	90MC	"		Check for tracking.

FIG. 1

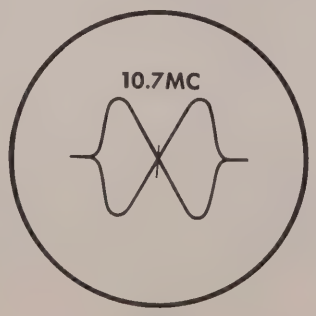


FIG. 2

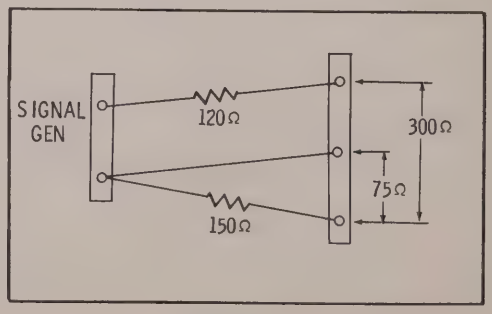


FIG. 3

PARTS LIST AND DESCRIPTIONS

TUBES

• CBS •	GENERAL ELECTRIC •	RAYTHEON •	SYLVANIA •

ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	FM RF Amplifier	6AB4	V5	1st AM IF Amp.	6BA6
V2	FM Conv.-AFC	ECC81/12AT7	V6	2nd FM-AM Amp.	6AU6
V3	1st FM IF Amp.	6BA6	V7	FM Limiter	6AU6
V4	AM Converter	6BE6	V8	Rectifier	EZ80

ELECTROLYTIC CAPACITORS

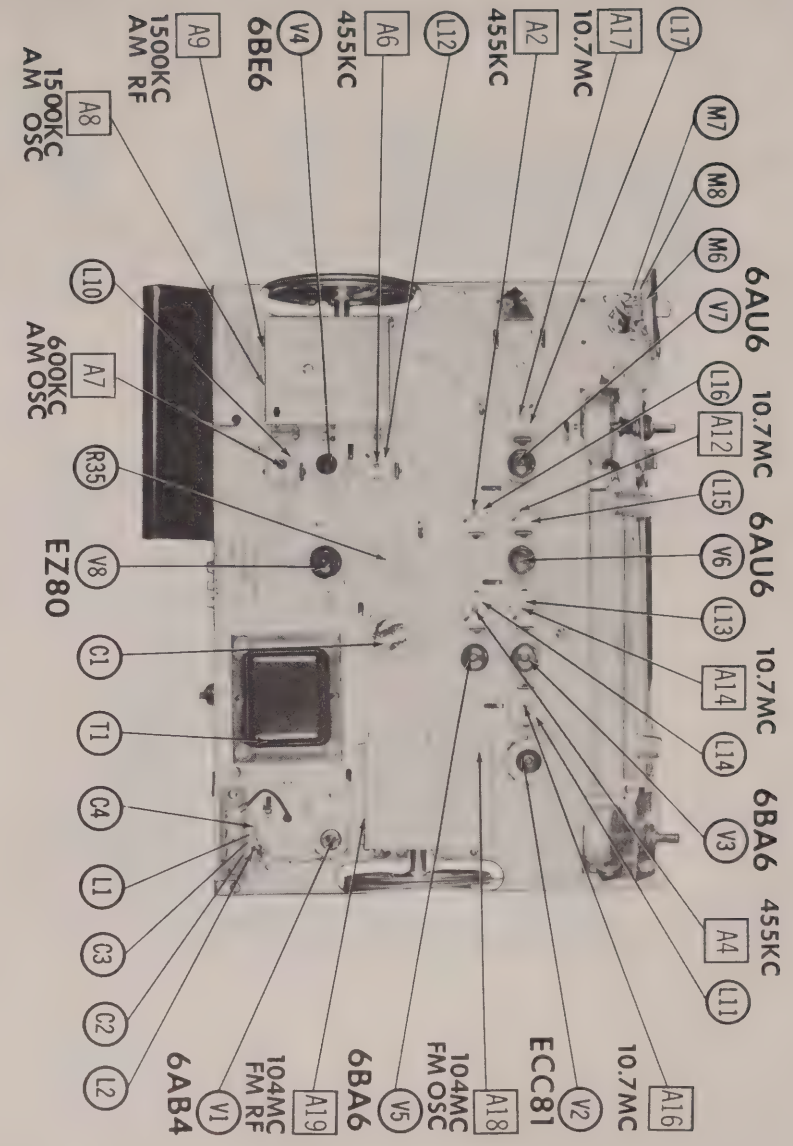
ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	CHALLENGER PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	■10	250	C543	AFH3-18	C0140	FP231.3	TMT-18	TVL-3639.8	
B	▲20	250				TC47			
C	30	150							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C2	47 10%		DI-47	DD-470	L10Q47	CCD-471	CNO-447	10TS-Q47
C3	4.7 NPO 5%		NPO-DI 4.7	DTN-4R7	C10V47C	CCTO-4R7	CNO-547	10TCC-V47
C4	12 NPO 10%			TCZ-12	C10Q12C	CCTO-120	CNO-412	10TCC-Q12
C5	220 10%		DI-220	DD-221	L10T22	CCD-221	JL-322	10TS-T22
C6	4.7 NPO ±.25mmf						CNO-547	
C7	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C8	47 10%		DI-47	DD-470	L10Q47	CCD-471	CNO-447	10TS-Q47
C9	1 10%		NPO-SI 1.0	TCZ-1			CNO-510	10TCC-V10
C10	220 10%		DI-220	DD-221	L10T22	CCD-221	JL-322	10TS-T22
C11	39 N220 10%					*		10TCR-Q22
C12	4.7 P100 10%							
C13		#C624						
C14	4.7 NPO ±.5mmf		NPO-DI 4.7	DTZ-4R7	C10V47C	CCTO-4R7	CNO-547	10TCC-V47
C15	220 10%		DI-220	DD-221	L10T22	CCD-221	JL-322	10TS-T22
C16	.047 200V		P288N-047	DF-503	CUB2S47	4DP-3-473	GEM-4147	2TM-S47
C17	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C18	1000 10%		DI-1000	DD-102	1R5D1	CCS-102	JL-210	10TS-D10
C19	220 10%		DI-220	DD-221	L10T22	CCD-221	JL-322	10TS-T22
C20	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C21	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C22	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C23	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C24	.047 200V		P288N-047	DF-503	CUB2S47	4DP-3-473	GEM-4147	2TM-S47
C25	1.2 10%							10TCC-V12
C26	1000 10%		DI-1000	DD-102	1R5D1	CCD-102	JL-210	10TS-D10
C27	.047 200V		P288N-047	DF-503	CUB2S47	4DP-3-473	GEM-4147	2TM-S47
C28	1.8 10%							10TCC-V18
C29	47 10%		DI-47	DD-470	L10Q47	CCD-470	CNO-447	10TS-Q47
C30	8.2 NPO 10%		NPO-DI 8.2		C10V82C			10TCC-V82
C31	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C32	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C33	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C34	2.4 10%							
C35	4.7 NPO ±.5mmf		NPO-DI 4.7	DTZ-4R7	C10V47C	CCTO-4R7	CNO-547	
C36	1500 10%		DI-1500	DD-152	1R5D15	CCS-152	JL-215	10TS-D15
C37	1200 10%		DI-1200	DD-122	1R5D12	CCS-122	JL-212	10TS-D12
C38	22 10%		DI-22	DD-220	L10Q22	CCD-220	CNO-422	10TS-Q22
C39	39 10%	(47mmf) †	DI-39	DD-390	L10Q39	CCD-390	CNO-439	10TS-Q39
C40	1500 10%		DI-1500	DD-152	1R5D15	CCS-152	JL-215	10TS-D15
C41	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C42	15 N750 10%		N750-DI 15	DTN-15	C10Q15U	CCTN-150	CN7-415	10TCU-Q15
C43	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C44	27 NPO 10%			TCZ-27	C10Q27C	CCTO-270	CNO-427	10TCC-Q27
C45	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C46	22 10%		DI-22	DD-220	L10Q22	CCD-220	CNO-422	10TS-Q22
C47	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C48	.1 200V		P288N-1	DF-104	CUB2P1	2DP-3-104	GEM-201	2TM-P1
C49	.1 200V		P288N-1	DF-104	CUB2P1	2DP-3-104	GEM-201	2TM-P1

CHASSIS—TOP VIEW



CHALLENGER
MODEL TC200A

PARTS LIST AND DESCRIPTIONS (Continued)

FIXED CAPACITORS (cont)

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C50	1500 1400V		HVD-15-1500	DD30-152	HVC16D15	16DP-1-152	2HV-215	30GA-D15
C51	1500 1400V		HVD-15-1500	DD30-152	HVC16D15	16DP-1-152	2HV-215	30GA-D15
C52	.047 600V		P688N-047	DF-503	CUB6S47	6DP-3-473	GEM-6147	6TM-S47
C53	15 2000V		HVD-30-15	DD30-150	HVA20Q15	VCM-20-150M	2DY-415	30GA-Q15
C54	1000		BPD-001	DD-102	BYA10D1M	CCD-102	B-210	5HK-D10

\# Challenger Part Number.
* Not normally in distributor's stock. Available thru distributor on order to manufacturer.
† Alternate Value.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R1	100K	
R2	220Ω	
R3	10K	
R4	220Ω	
R5	220K	
R6	220Ω	
R7	470Ω	
R8	5100Ω 7W	
R9	220Ω	
R10	100K	
R11	1meg	
R12	1meg	
R13	22K	

ITEM No.	RATING	REMARKS
R14	1500Ω 1W	
R15	470K	
R16	3.3meg	
R17	220Ω	
R18	100Ω	
R19	220Ω	
R20	120K	
R21	120K	
R22	220Ω	
R23	150Ω	(68Ω) *
R24	120K	
R25	100K	
R26	15K	

ITEM No.	RATING	REMARKS
R27	33K	
R28	100K	
R29	100K	
R30	10K	
R31	68K	
R32	1meg	
R33	220K	
R34	100K	
R35A	500Ω 5W	
B	500Ω 5W	#R140
C	500Ω 5W	

* Alternate
\# Challenger Part Number.

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		CHALLENGER PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	FM Ant. Trans.	U452						
L2	FM Ant. Coil	U451	19-1000	19-1000	BC-561	4602		1uh
L3	RF Choke	95-5001-01						①
L4	RF Choke	U420	19-1001	19-1001	BC-562	4604		1.7uh
L5	FM RF Coil	U470						
L6	RF Choke	U420	19-1001	19-1001	BC-562	4604		1.7uh
L7	FM Osc. Coil	95-0003-23						
L8	RF Choke	U501	19-1000	19-1000	BC-561	4602		1uh ②
L9	Loopstick	H694						
L10	AM Osc. Coil	H454	14-1412	14-1412				
L11	1st FM IF Trans.	H458	16-3487	16-3487	FM-254	1463		
L12	1st AM IF Trans.	H297	16-6758	16-6758	BC-352	12-C1	RF-1	
L13	2nd FM IF Trans.	H355	16-3487	16-3487	FM-254	1463		
L14	2nd AM IF Trans.	H297	16-6758	16-6758	BC-352	12-C1	RF-1	
L15	3rd FM IF Trans.	H355	16-3487	16-3487	FM-254	1463		
L16	3rd AM IF Trans.	H297	16-6758	16-6758	BC-353	12-C2	RF-2	
L17	Discriminator	H295	17-3494	17-3494	FM-253	1464		
L18	Fil. Choke	U512						1.9uh
L19	Line Choke	U512						1.9uh
L20	Line Choke	U512						1.9uh

① 2 Turns Of Wire On 47Ω Resistor.
② IRC Part #CLA.

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA						
	PRI.	SEC. 1	SEC. 2	CHALLENGER PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V@ .4A	400 VCT @.060A	6.3V@ 2.7A	83-507-020①						

① Alternate Part #83-507-000.

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	CHALLENGER PART No.	REPLACEMENT DATA
K1	AM Det. RF Filter	100mmf, 100mmf, 47K	78-907-001	Aerovox PA-97 Centralab PC-50 Cornell-Dubilier 111TM1 Sprague D-1

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA				NOTES
		CHALLENGER PART No.	CBS PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
M1	1N541 *		1N60	1N60	1N295	Discriminator (Pigtail)
M2	1N541 *		1N60	1N60	1N295	Discriminator (Pigtail)
M3	1N54 †		1N54		1N54	AM Det. (Pigtail)

* Some versions may use a matched pair of 1N542 in this application.
† Some versions may use 1N541 in this application.

MISCELLANEOUS

ITEM No.	PART NAME	CHALLENGER PART No.	NOTES
M4	Tuning Cap	80-0119-01	FM, 2 Gang
M5	Tuning Cap	80-0118-01	AM, 2 Gang Ant. 28-531mmf, Osc. 16-163mmf
M6	Switch	81-003-004	Off-On (SPDT Slide Type)
M7	Switch	S-475	FM Off-On-AFC Off (DPTT Slide Type)
M8	Switch	81-003-002	AM Off-On (DPDT Slide Type)

WIRING DATA

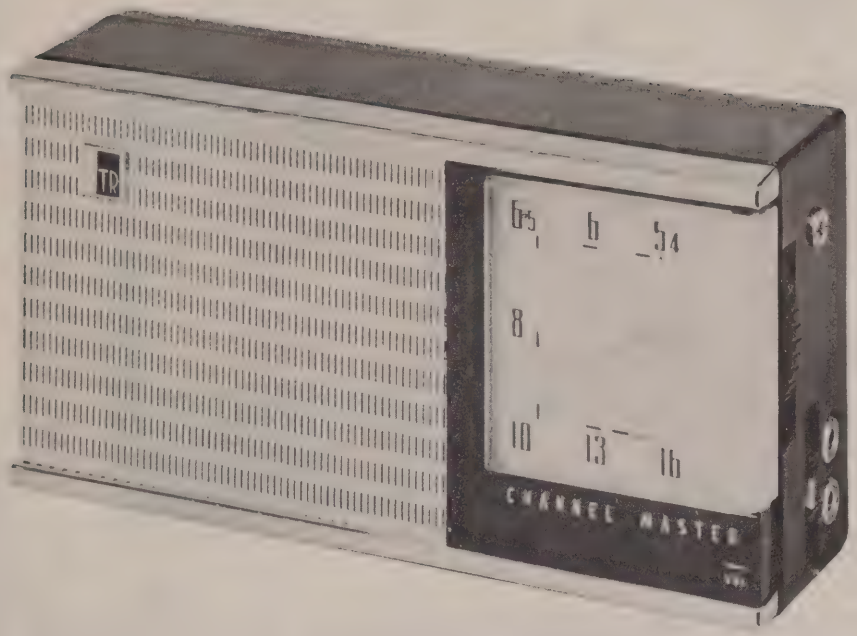
General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors
Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)

PHOTOFACT® Folder with CIRCUITRACE®

EIA MEMBER

CHANNEL MASTER MODEL 6506

CHANNEL MASTER
MODEL 6506



CHANNEL MASTER
MODEL 6506

TRADE NAME	Channel Master Model 6506
MANUFACTURER	Channel Master Corp., Ellenville, N. Y.
TYPE SET	Battery Operated Portable Transistorized AM Receiver
POWER SUPPLY	6 Volts DC
TUNING RANGE—BROADCAST	535 – 1620KC
RATING	4MA @ 6 Volts DC (No Signal, Min. Volume) 5.5MA @ 6 Volts DC (Signal, Normal Volume)

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested alignment tools: A4, A5..... GENERAL CEMENT #9087, 9089
WALSCO #2528

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.		Loop	455KC (400~ Mod.)	1600KC	Across voice coil	A1, A2, A3	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
2.		"	1400KC	1400KC Signal	"	A4, A5	Adjust for maximum output while rocking tuning gang.
3.		"	600KC	600KC	"	A6	"

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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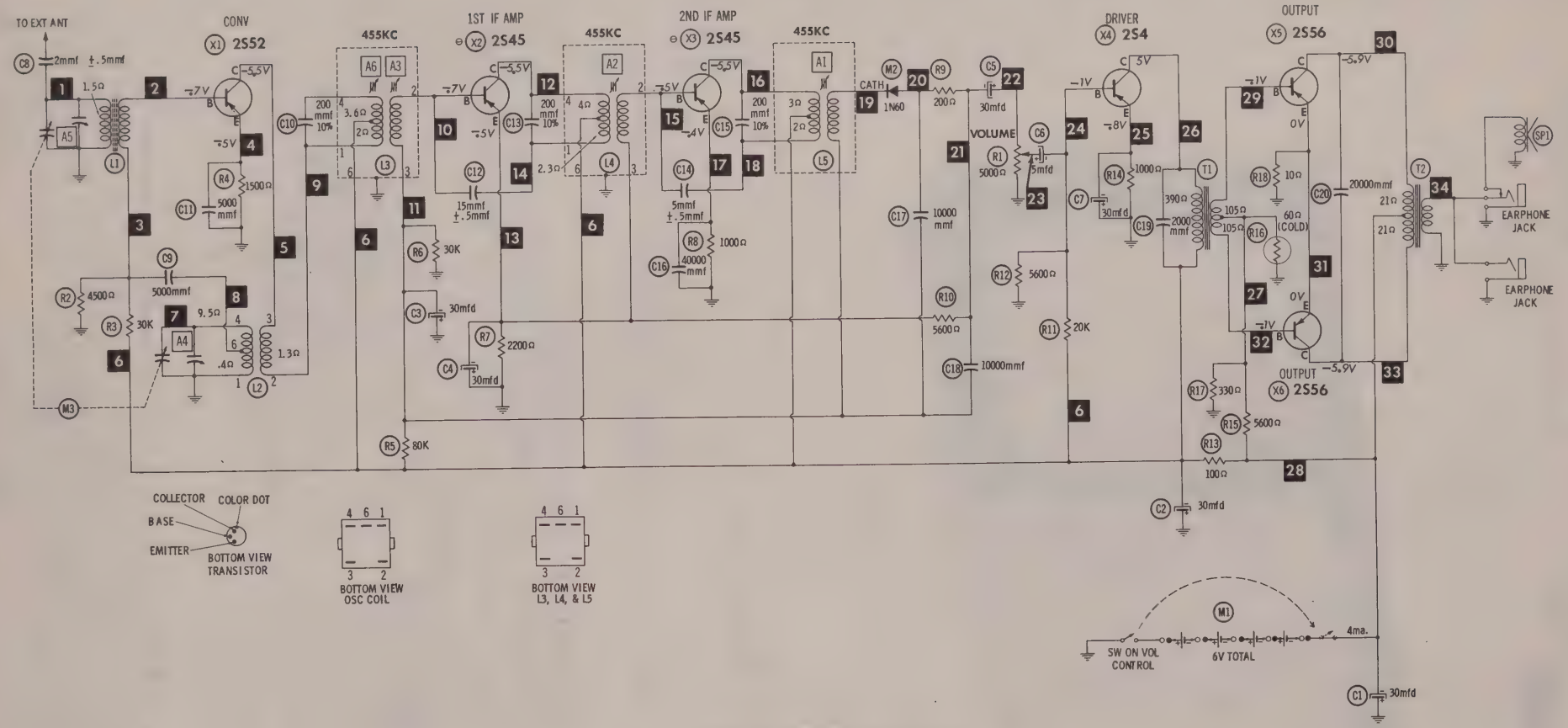
JF367

SET 470 FOLDER 6



RESISTANCE MEASUREMENTS NOT GIVEN BECAUSE OF THE WIDE VARIATION IN INTERNAL TRANSISTOR RESISTANCE.

NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

❸ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

1. DC voltage measurements taken with vacuum tube voltmeter.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
5. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC with CIRCUITRACE®

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CHANNEL MASTER MODEL 6506

PARTS LIST AND DESCRIPTIONS

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA				NOTES
			CBS PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	2S52	Converter			2N486	2N411	PNP
X2	2S45*	1st IF Amplifier			2N483	2N409	PNP
X3	2S45*	2nd IF Amplifier			2N483	2N409	PNP
X4	2S44	Driver			2N362	2N407	PNP
X5	2S56	Output			2N632	2N407	PNP } Matched
X6	2S56	Output			2N632	2N407	PNP } Pair

* Alternate type 2S53

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	Channel Master PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1	30	6	A009	BCD6035	ECPB112	TT6X30	ML30-6	TE-1092	
C2	30	6	A009	BCD6035	ECPB112	TT6X30	ML30-6	TE-1092	
C3	30	6	A009	BCD6035	ECPB112	TT6X30	ML30-6	TE-1092	
C4	30	6	A009	BCD6035	ECPB112	TT6X30	ML30-6	TE-1092	
C5	30	6	A009	BCD6035	ECPB112	TT6X30	ML30-6	TE-1098	
C6	5	6	A010	XPP-6005	NLW5-6	TT6X5	ML5-6	TE-1084	
C7	30	6	A009	BCD6035	ECPB112	TT6X30	ML30-6	TE-1092	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C8	2 ±.5mmf				C10V2C	CCTO-2R2		10TCC-V22
C9	5000		BPD-005	DD-502	BYA10D5	CCD-502	GP250	10TS-D50
C10	200 10%		NPO-SI 200	D6-201	L10T2	CCD-201	GP320	10TS-T20
C11	5000		BPD-005	DD-502	BYA10D5	CCD-502	GP250	10TS-D50
C12	15 ±.5mmf		NPO-DI 15	DTZ-15	C10V15C	CCTO-150	CNO-15	10TCC-Q15
C13	200 10%		NPO-SI 200	D6-201	L10T2	CCD-201	GP250	10TS-T20
C14	5 ±.5mmf		NPO-DI 5	DTZ-4R7	C10V5C	CCTO-050	CNO-550	10TCC-V50
C15	200 10%		NPO-SI 200	D6-201	L10T2	CCD-201	GP320	10TS-T20
C16	40000		BPD-04	DD-403	BYB6S4		GP140	5HK-S40
C17	10000		BPD-01	DD-103	BYA10S1	CCD-103	GP110	5HK-S10
C18	10000		BPD-01	DD-103	BYA10S1	CCD-103	GP110	5HK-S10
C19	2000		BPD-002	DD-202	BYA10D2	CCD-202	GP220	5HK-D20
C20	20000		BPD-02	DD-203	BYB6S2	CCD-203	GP120	5HK-S20

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	Channel Master PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1	5000Ω	1/4	E008	B16-214				Volume & Switch

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		Channel Master PART No.	NOTES
	OHMS	WATT		
R2	4500Ω		B014	
R3	30K		B013	
R4	1500Ω		B015	
R5	80K		B016	
R6	30K		B013	
R7	2200Ω		B017	
R8	1000Ω		B005	
R9	200Ω		B018	
R10	5600Ω		B019	

ITEM No.	RATING		Channel Master PART No.	NOTES
	OHMS	WATT		
R11	20K		B020	
R12	5600Ω		B019	
R13	100Ω		B005	
R14	1000Ω		B022	
R15	5600Ω		B002	
R16	60Ω(cold)		F150	
R17	330Ω		B023	
R18	10Ω		B024	

PRINTED BOARD

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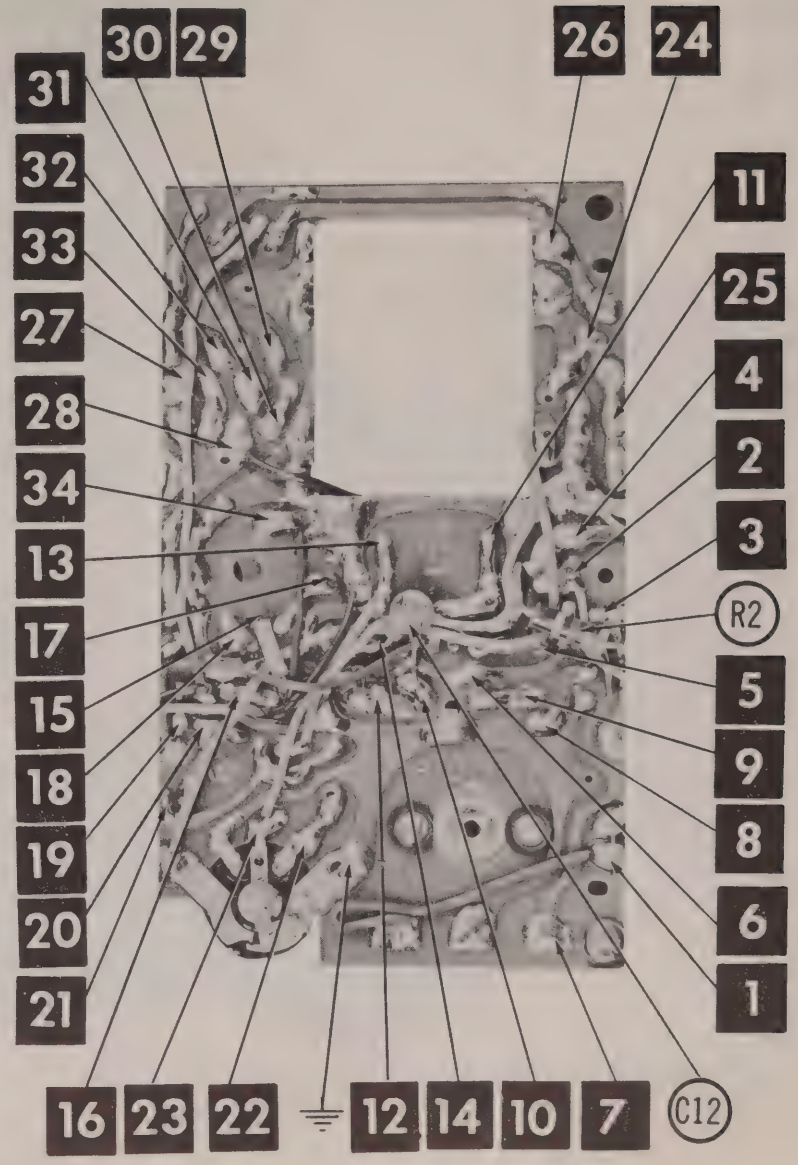


PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		Channel Master PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	Loopstick	E009						
L2	Osc. Coil	F135						
L3	1st IF Trans.	C005						
L4	2nd IF Trans.	C006						
L5	3rd IF Trans.	C007						

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA						NOTES
	PRI.	SEC.	Channel Master PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	1	1	C008	TR-2		TA-30	TR-2		

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	Channel Master PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	500Ω CT	6-8Ω	C009	TR-102			TA-21	TR-102		

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	Channel Master PART No.	QUAM PART No.	
SP1	2½"	PM	6-8Ω	G092		

BATTERIES

ITEM No.	VOLTAGE	Channel Master PART No.	REPLACEMENT DATA						NOTES
			BURGESS		EVEREADY		MALLORY		
			"A"	"B"	"A"	"B"	"A"	"B"	
M1	6V			930		1015		M-15R	4 Used

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA				NOTES
		Channel Master PART No.	CBS PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
M2	1N60	F149	1N60	1N60	1N60	Detector (Pigtail)

MISCELLANEOUS

ITEM No.	PART NAME	Channel Master PART No.	NOTES
M3	Tuning Cap.	A001	2 Gang

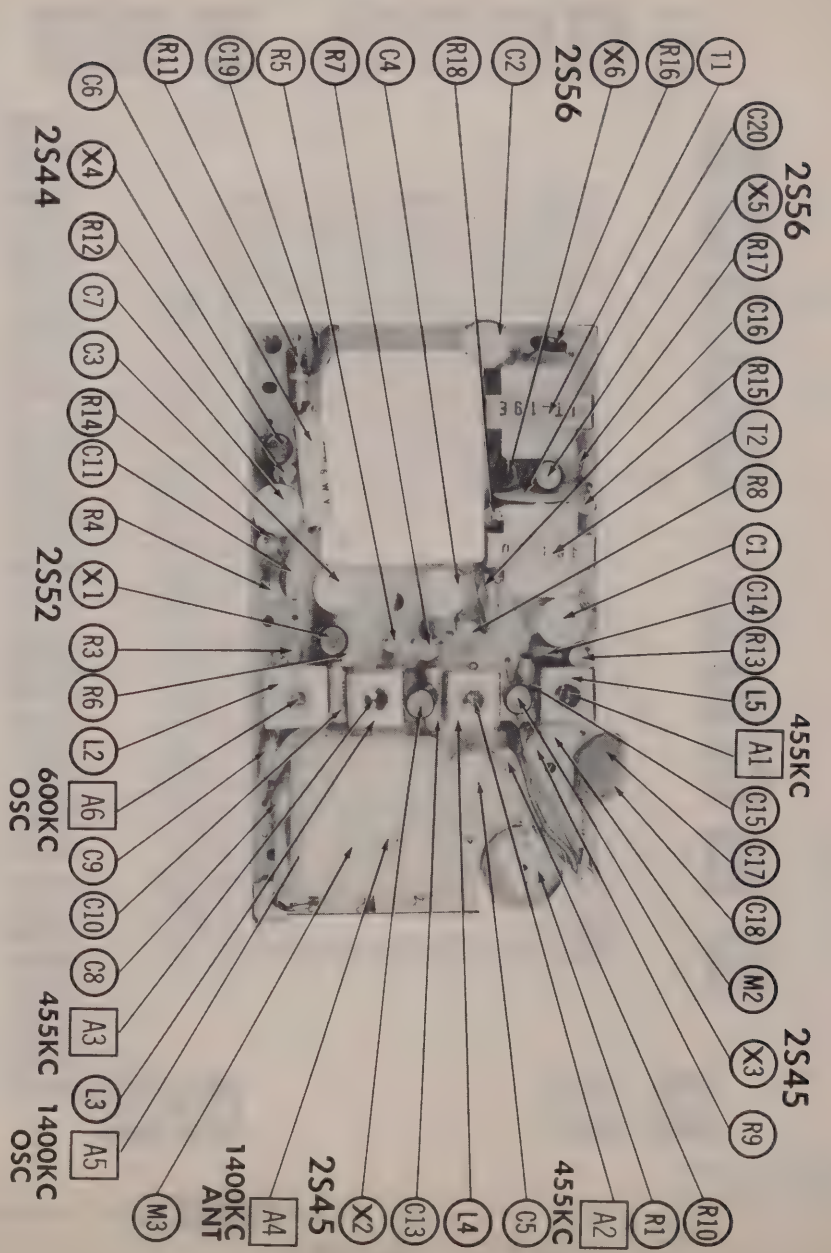
CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

WIRING DATA

General-use Unshielded Hook-up Wire .....Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

CHASSIS—TOP VIEW



PHOTOFACT® Folder

COLUMBIA
MODEL 617

COLUMBIA
MODEL 617

COLUMBIA
MODEL 617

TRADE NAME	Columbia Model 617
MANUFACTURER	CBS Electronics, 100 Endicott Street, Danvers, Massachusetts
TYPE SET	AC Operated 3 Tube Phono Amplifier With 4 Speed Automatic Record Changer
POWER SUPPLY	110-120 Volts AC, 60 Cycles RATING 30 Watts, .33 Amp. @ 117 Volts AC (Less Motor)

FOR SERVICE INFORMATION ON RECORD CHANGER - SEE SIMILAR V-M1201 - PHOTOFACT SET 436 FOLDER 18

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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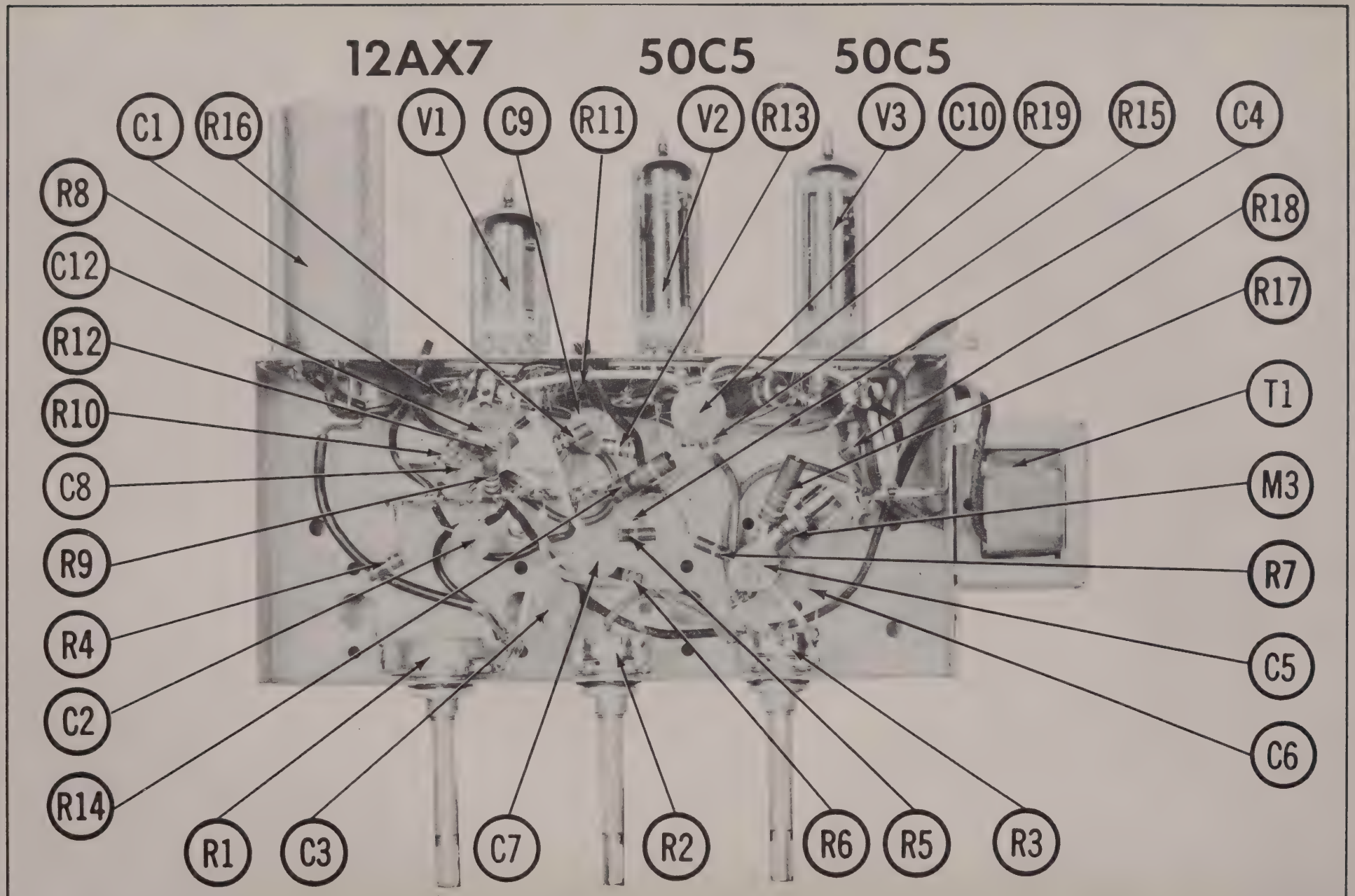


CHASSIS BOTTOM VIEW

PARTS LIST AND DESCRIPTIONS

TUBES

◆ CBS ◆		GENERAL ELECTRIC ◆		◆ RAYTHEON ◆		◆ SYLVANIA ◆
ITEM No.	USE	TYPE	ITEM No.	USE	TYPE	
V1	AF Amplifier - Phase Inverter	12AX7	V2	Output	50C5	
			V3	Output	50C5	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	COLUMBIA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	60	150	11B713	PRS3800	BBRT84215	TCT3117	TDLT-7	TVA-3455	
B	40	150							
C	20	150							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C2	3000		DI-3000	DD-302	BYA10D3	CCD-302	B-233	5GA-D30
C3	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C4	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C5	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C6	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C7	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C8	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C9	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C10	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C11	.5 200V		P288N-5		CUB2P5	2DP-5-504	GEM-205	2TM-P5
C12	.05 400V		P488N-05	DF-503	CUB4S5	4DP-3-503	GEM-415	4TM-S5

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	COLUMBIA PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	1meg	½	9B611	BT-72	A47F-1meg	Q13-137X	UT-440	Volume, Tap ⓐ 250K
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	
R2A	1meg	½	9B610	B-70	A47-1meg-Z	Q13-137	U53	Treble
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	
R3A	1meg	½	9B610	B-70	A47-1meg-Z	Q13-137	U53	Bass
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R4	100K	
R5	100K	
R6	10K	
R7	100K	
R8	10meg	
R9	270K	

ITEM No.	RATING	REMARKS
R10	47K	
R11	10meg	
R12	270K	
R13	470K	
R14	100Ω 1W	
R15	470K	

ITEM No.	RATING	REMARKS
R16	3300Ω	
R17	2700Ω 1W	
R18	47Ω 2W	
R19	47Ω 2W	

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.1	COLUMBIA PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	4200Ω CT	3-4Ω SEC.2 25Ω	3B212							

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	COLUMBIA PART No.	QUAM PART No.	
SP1	6"	PM	3-4Ω	1B108	6A21	
SP2	2"			1B142		

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA								
	COLUMBIA PART No.	ASTATIC PART No.		ELECTRO-VOICE PART No.		JENSEN PART No.		SONOTONE PART No.	
		CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE
M1	TO-400-OV	118-TS	N8-1J			3	CRA-55 † or CRA-55D ♦ and CRA-55LP † or CRA-55LPD ♦		

† Jewel ♦ Diamond

ASTATIC AND JENSEN NEEDLE LISTINGS SHOWN ABOVE ARE SPECIFIED FOR THE REPLACEMENT CARTRIDGE LISTED. FOR ORIGINAL CARTRIDGE NEEDLE REPLACEMENTS SEE BELOW.

PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA			REMARKS
	COLUMBIA PART No.	CLEVITE WALCO PART No.	JENSEN PART No.	
M2	(78RPM)	W-64S † or W-64D ♦	CRA-55 † or CRA-55D ♦	† Jewel ♦ Diamond
	(LP)	W-64MGS † or W-64MGD ♦	CRA-55LP † or CRA-55LPD	

RECTIFIERS

ITEM No.	RATING	REPLACEMENT DATA						
	CURRENT (Measured)	COLUMBIA PART No.	INTERNATIONAL PART No.	ITT PART No.	SARKES TARZIAN PART No.	SYLVANIA PART No.	NOTES
M3	.078A	10B614 ①	SD-94 ①	HF154 ①	M150 ①	SR200 ①	① Silicon Type

MISCELLANEOUS

ITEM No.	PART NAME	COLUMBIA PART No.	NOTES
M4	Switch		Mono-Stereo, (DPDT Slide Type)
M5	Switch		Off-On

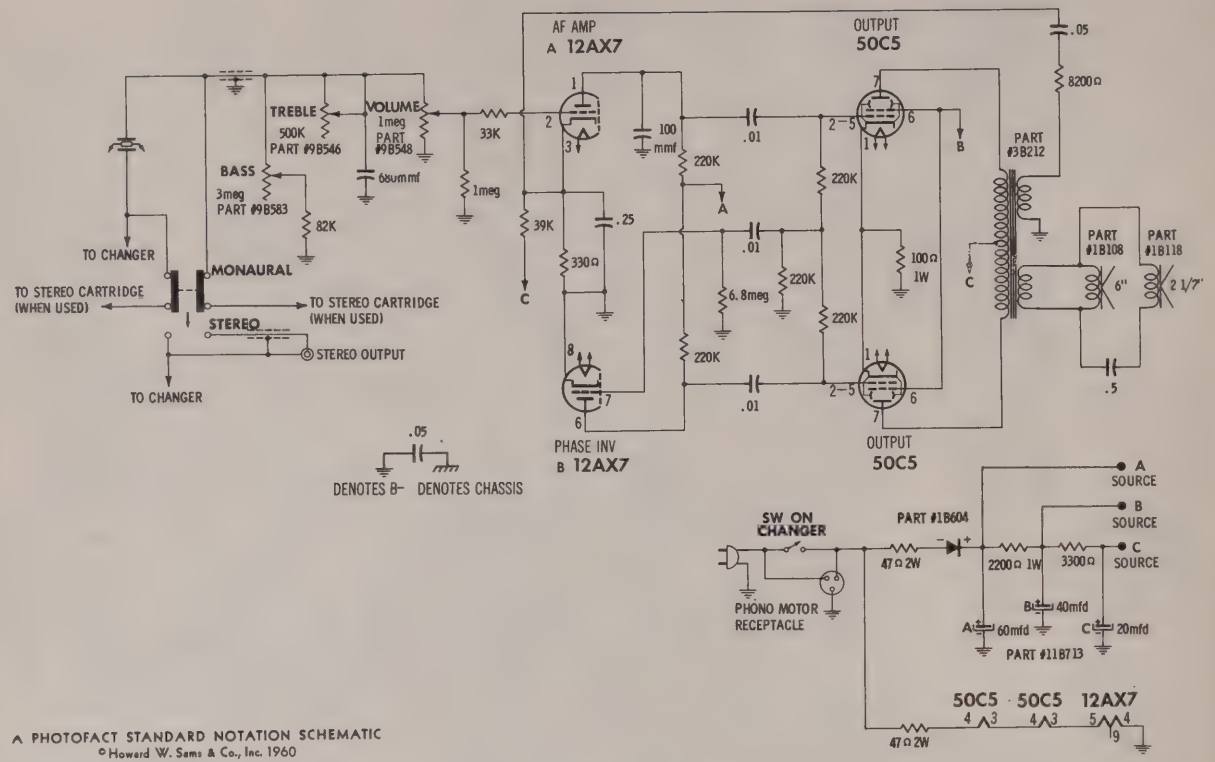
CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	8B455	Black
Knob	8B468	Mahogany
Knob	8B467	Brown-Chrome
Cabinet	17B820	Gray
Cabinet	17B821	Tan
Cabinet	17B962	Brown and Tan Briar
Cabinet	17B963	Black and Gray Briar

WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No.	8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord	Use BELDEN No.	1765-B (6 Ft. Length) 1725-K (7½ Ft. Length)
Low-Loss Shielded Lead (Interconnecting)	Use BELDEN No.	8401
Phono Pick-up Arm Cable	Use BELDEN No.	8430 (Two Conductor - Twisted)



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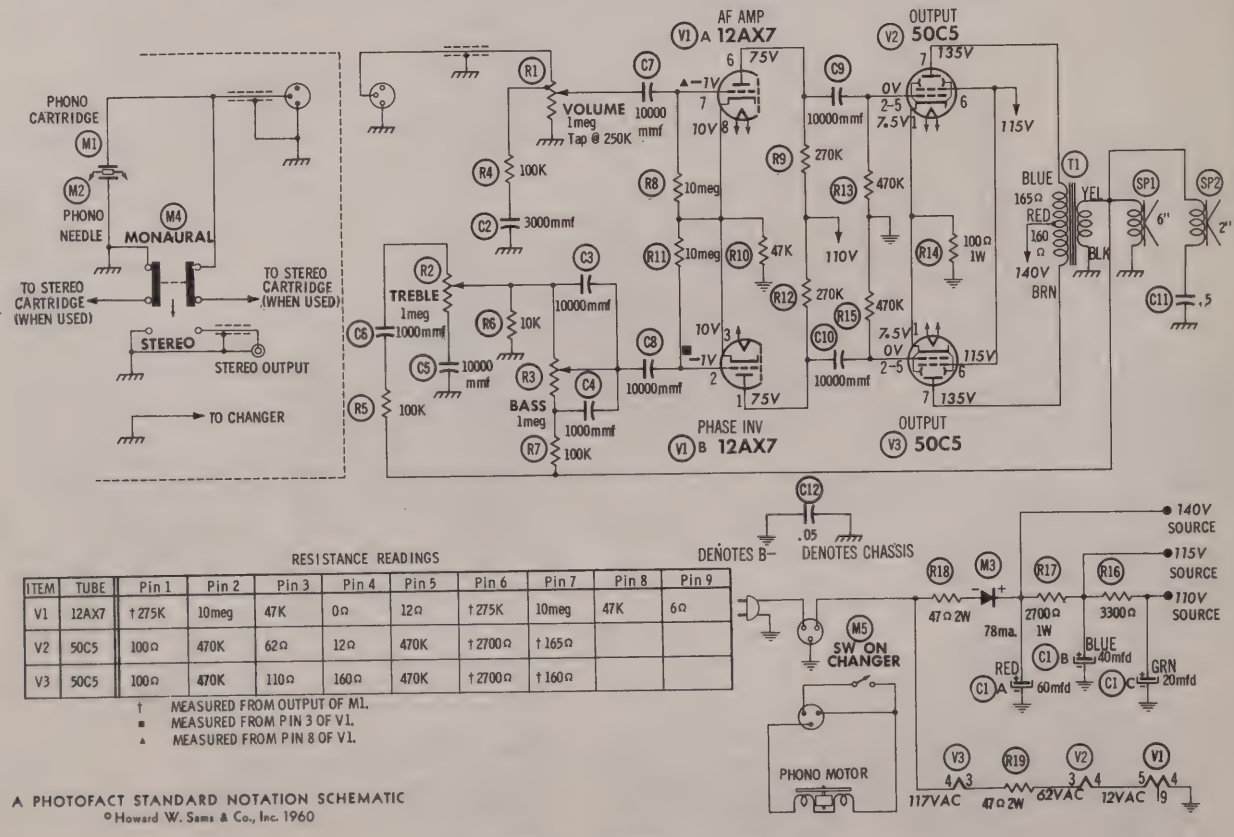
BEFORE SERIAL #1710



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12AX7	†275K	10meg	47K	0Ω	12Ω	†275K	10meg	47K	6Ω
V2	50C5	100Ω	470K	62Ω	12Ω	470K	†2700Ω	†165Ω		
V3	50C5	100Ω	470K	110Ω	160Ω	470K	†2700Ω	†160Ω		

† MEASURED FROM OUTPUT OF M1.
■ MEASURED FROM PIN 3 OF V1.
▲ MEASURED FROM PIN 8 OF V1.

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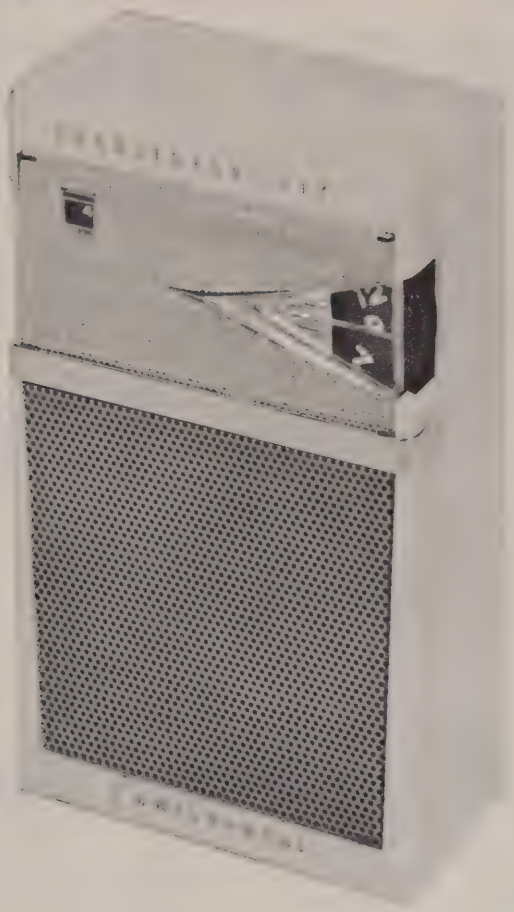
AFTER SERIAL #1710

PHOTOFACT® Folder with CIRCUITRACE®

CONTINENTAL MODEL TR-200

CONTINENTAL
MODEL TR-200



CONTINENTAL
MODEL TR-200

TRADE NAME	Continental Model TR-200
IMPORTER	Continental Merchandise Co., 236 Fifth Ave., New York 1, N. Y.
TYPE SET	Battery Operated Transistorized AM Receiver
POWER SUPPLY	9 Volts DC
TUNING RANGE—BROADCAST	535 - 1605KC
RATING	5.7MA @ 9 Volts DC (No Signal, Min. Volume) 9MA @ 9 Volts DC (Signal, Normal Volume)

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested Alignment Tools: A1, A2, A3, A5 ..... GENERAL CEMENT #5009, 8195, 8274, 8275, 8728, 8987
WALSCO #2531
A4, A6 ..... GENERAL CEMENT #5000, 5003, 8276, 8290
WALSCO #2512, 2525

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.		Loop	455KC (400∿ Mod.)	Tuning gang fully open	Across voice coil	A1, A2, A3	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
2.		"	1605KC	"	"	A4	"
3.		"	600KC	Tune to 600KC signal	"	A5	"
4.		"	1400KC	Tune to 1400KC signal	"	A6	Adjust for maximum output while rocking tuning gang.

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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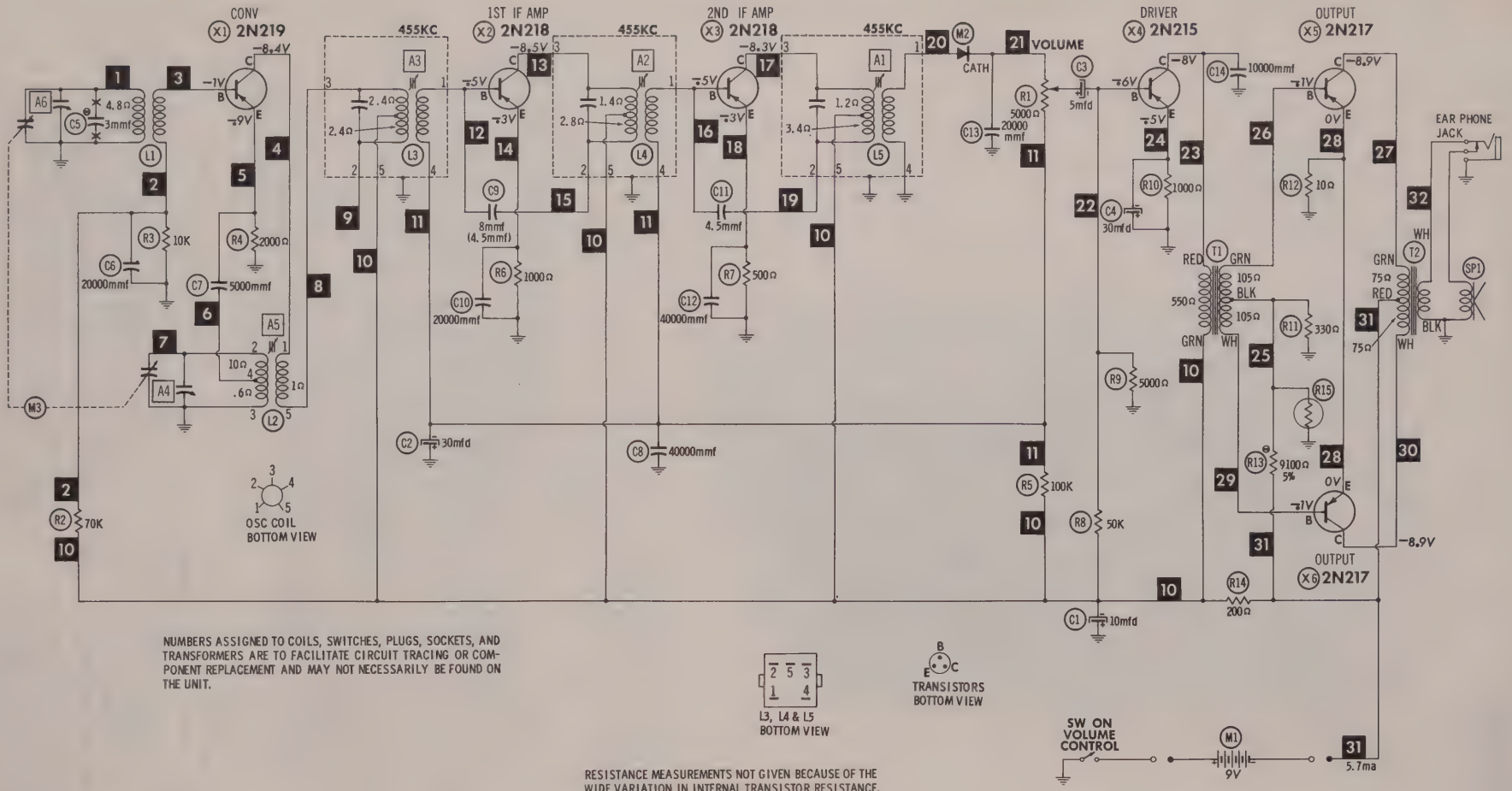

NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

RESISTANCE MEASUREMENTS NOT GIVEN BECAUSE OF THE WIDE VARIATION IN INTERNAL TRANSISTOR RESISTANCE.

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

1. DC voltage measurements taken with vacuum tube voltmeter.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
5. Volume control at maximum, no signal applied for voltage measurements.

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with CIRCUITRACE®

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CONTINENTAL
MODEL TR-200

PARTS LIST AND DESCRIPTIONS

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA				NOTES
			CBS PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	2N219	Converter		2N219		2N112	PNP
X2	2N218	1st IF Amplifier		2N215	2N483	2N219	PNP
X3	2N218	2nd IF Amplifier		2N215	2N483	2N219	PNP
X4	2N215	Driver		2N215	2N362	2N217	PNP
X5	2N217	Output		2N217	2N631	2N217	PNP } Matched
X6	2N217	Output		2N217	2N631	2N217	PNP } Pair

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	Continental PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1	10	10			NLW10-10				
C2	30	3			NLW30-6		ML25-3		
C3	5	3		XPP-3005	NLW5-6	TT6X5	ML5-6	TE-1052.2	
C4	30	3			NLW30-6		ML25-3		

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C5	3	①	NPO-SI 3.0	TCZ-3R3	C10V3C	CCTO-3R3	CNO-533	10TCC-V33
C6	20000		C-80V203AM			CCD-203		TG-S20
C7	5000		C-80V502AM	DDM-502	H-05D5	CCD-502	TA-250	TG-D50
C8	40000		C-80V503AM			1DP-2-403		TG-S50
C9	8	(4.5mmf) *	NPO-SI 8.2		C10V8C			10TCC-V82
C10	20000		C-80V203AM	DDM-203		CCD-203		TG-S20
C11	4.5		NPO-SI 4.7	TCZ-4R7	C10V47C	CCTO-4R7	CNO-547	10TCC-V47
C12	40000		C-80V503AM			1DP-2-403		TG-S50
C13	20000		C-80V203AM	DDM-203		CCD-203		TG-S20
C14	10000		C-80V103AM	DDM-103	H-05S1	CCD-103	TA-110	TG-S10

① Not used in some versions. * Alternate Value.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	Continental PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1	5000Ω	.2	34.011					Volume & Switch

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R2	70K	
R3	10K	
R4	2000Ω	
R5	100K	
R6	1000Ω	

ITEM No.	RATING	REMARKS
R7	500Ω	
R8	50K	
R9	5000Ω	
R10	1000Ω	
R11	330Ω	

ITEM No.	RATING	REMARKS
R12	10Ω	
R13	9100Ω 5%	Note 1
R14	200Ω	
R15		(Temp. Comp.)

Note 1. Value may vary. Replace with same value as original.

PRINTED BOARD

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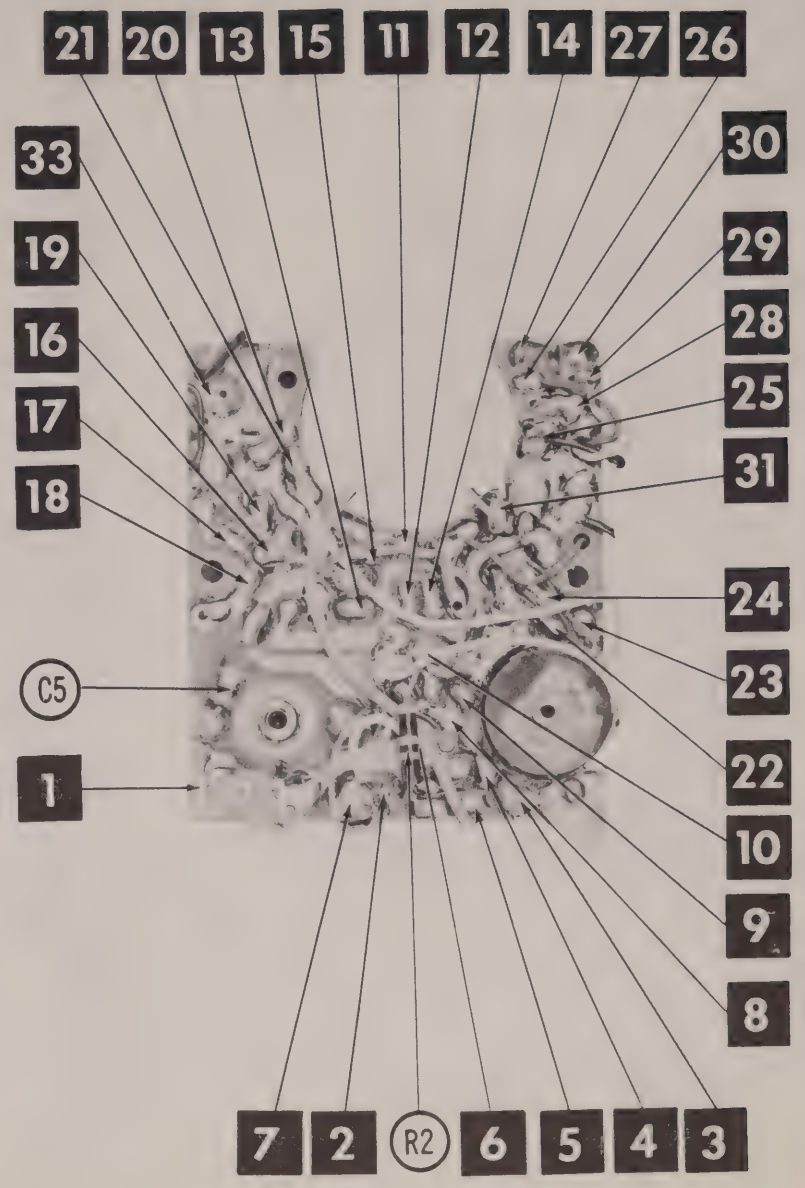


CONTINENTAL MODEL TR-200

FOLDER 8

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		Continental PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	Loopstick							
L2	Osc. Coil							
L3	1st IF Trans.							
L4	2nd IF Trans.							
L5	3rd IF Trans.							

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA						NOTES
	PRI.	SEC.	Continental PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	1	1	1T502						

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	Continental PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	1000Ω CT	10Ω	0T502							

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	Continental PART No.	QUAM PART No.	
SP1	2"	PM	10-12Ω			

BATTERIES

ITEM No.	VOLTAGE	Continental PART No.	REPLACEMENT DATA						NOTES
			BURGESS		EVEREADY		MALLORY		
			"A"	"B"	"A"	"B"	"A"	"B"	
M1	9V	BL-006P		2U6		216		M-1604	

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA				NOTES
		Continental PART No.	CBS PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
M2			1N60	1N60	1N60	

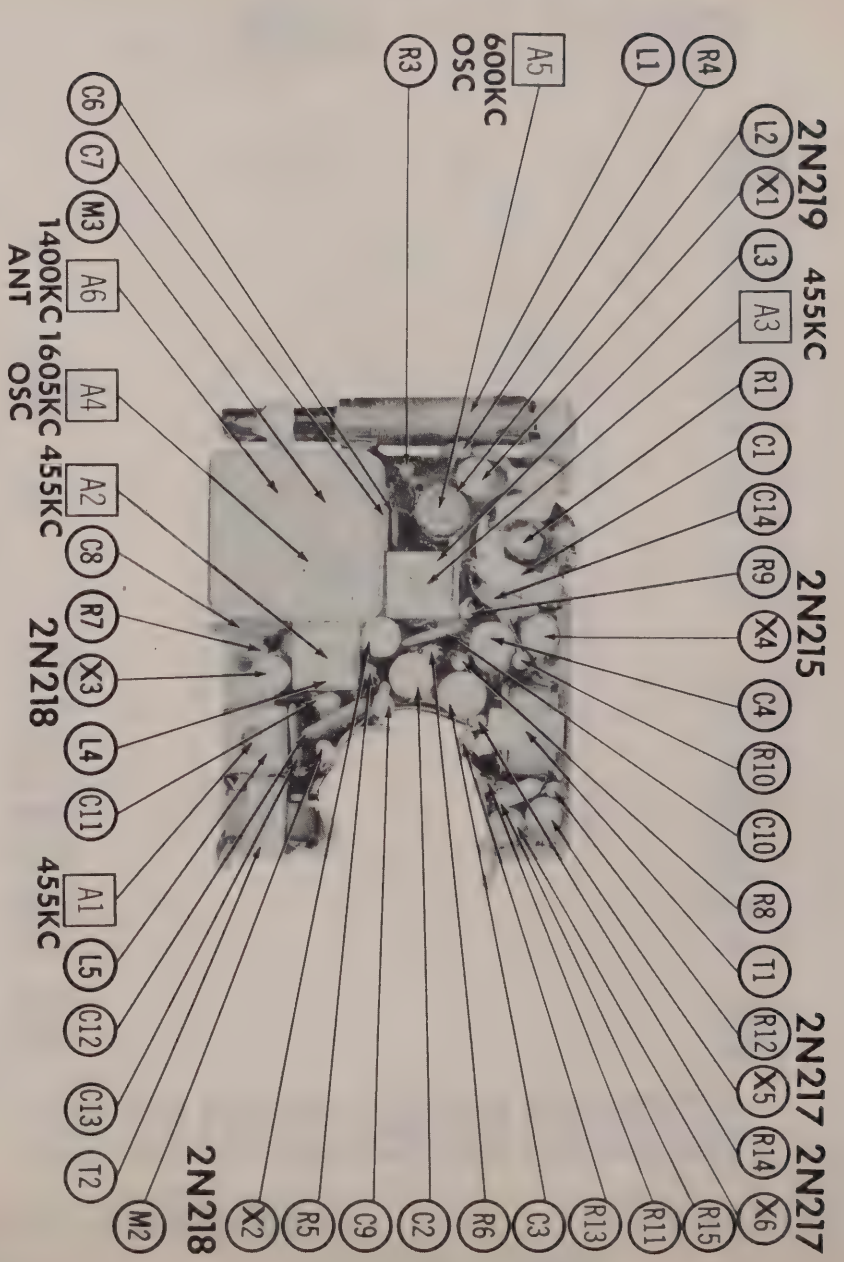
MISCELLANEOUS

ITEM No.	PART NAME	Continental PART No.	NOTES
M3	Tuning Cap.		2 Gang

WIRING DATA

General-use Unshielded Hook-up Wire .....Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

CHASSIS—TOP VIEW

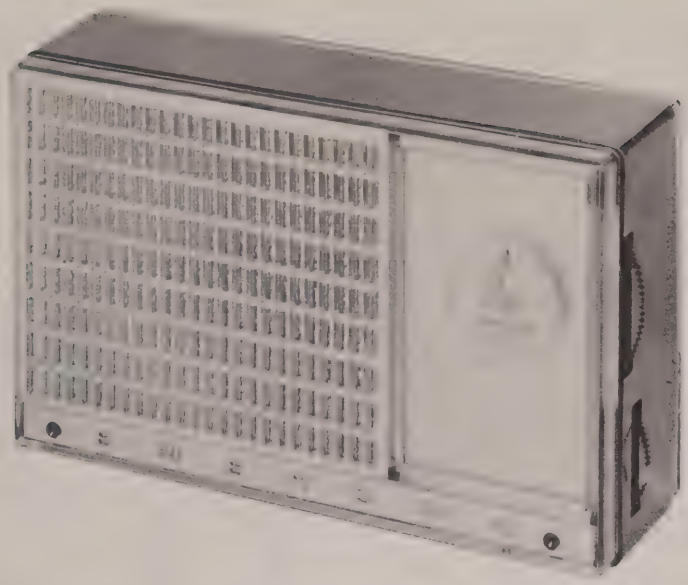


PHOTOFACT® Folder with CIRCUITRACE®

EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

EMERSON MODEL 555 (Ch. 120457)

EMERSON MODEL
555 (Ch. 120457)



TRADE NAME	Emerson Model 555 (Ch. 120457)
MANUFACTURER	Emerson Radio & Phono Corp., 524 W. 23rd Street, New York 11, N. Y.
TYPE SET	Battery Operated Transistorized Portable AM Receiver
POWER SUPPLY	6 Volts DC
RATING	23MA @ 6 Volts DC
TUNING RANGE—BROADCAST	540 - 1638 KC

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested alignment tools:

A1, A2, A3..... GENERAL CEMENT #8282, 8606, 8606L, 9091
WALSCO #2526, 2541, 2543, 2544

A4, A5.....GENERAL CEMENT #5000, 5003, 5014, 5015, 5016, 8276, 8290
WALSCO #2512, 2515, 2522, 2523, 2525, 2537

A6.....GENERAL CEMENT #8606, 8606L, 8282, 9295
WALSCO #2543, 2544, 2545, 2526

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1mfd	High side to stator lug of antenna section tuning gang. Low side to chassis.	455KC (400∿ Mod.)	Tuning gang fully open.	Across voice coil.	A1, A2, A3	Adjust for maximum output.
2.		Loop	1638KC	"	"	A4	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		"	1450KC	Tune to 1450KC Signal	"	A5	"
4.		"	600KC	Tune to 600KC Signal	"	A6	Adjust for maximum output while rocking tuning gang. Repeat Steps 2 thru 4.

DISASSEMBLY INSTRUCTIONS

1. Remove back cover by inserting coin in slot at cabinet bottom and twisting.
2. Remove Phillips head screw from printed board.
3. Lift that side of printed board from which the screw was removed and slide board away from cabinet.

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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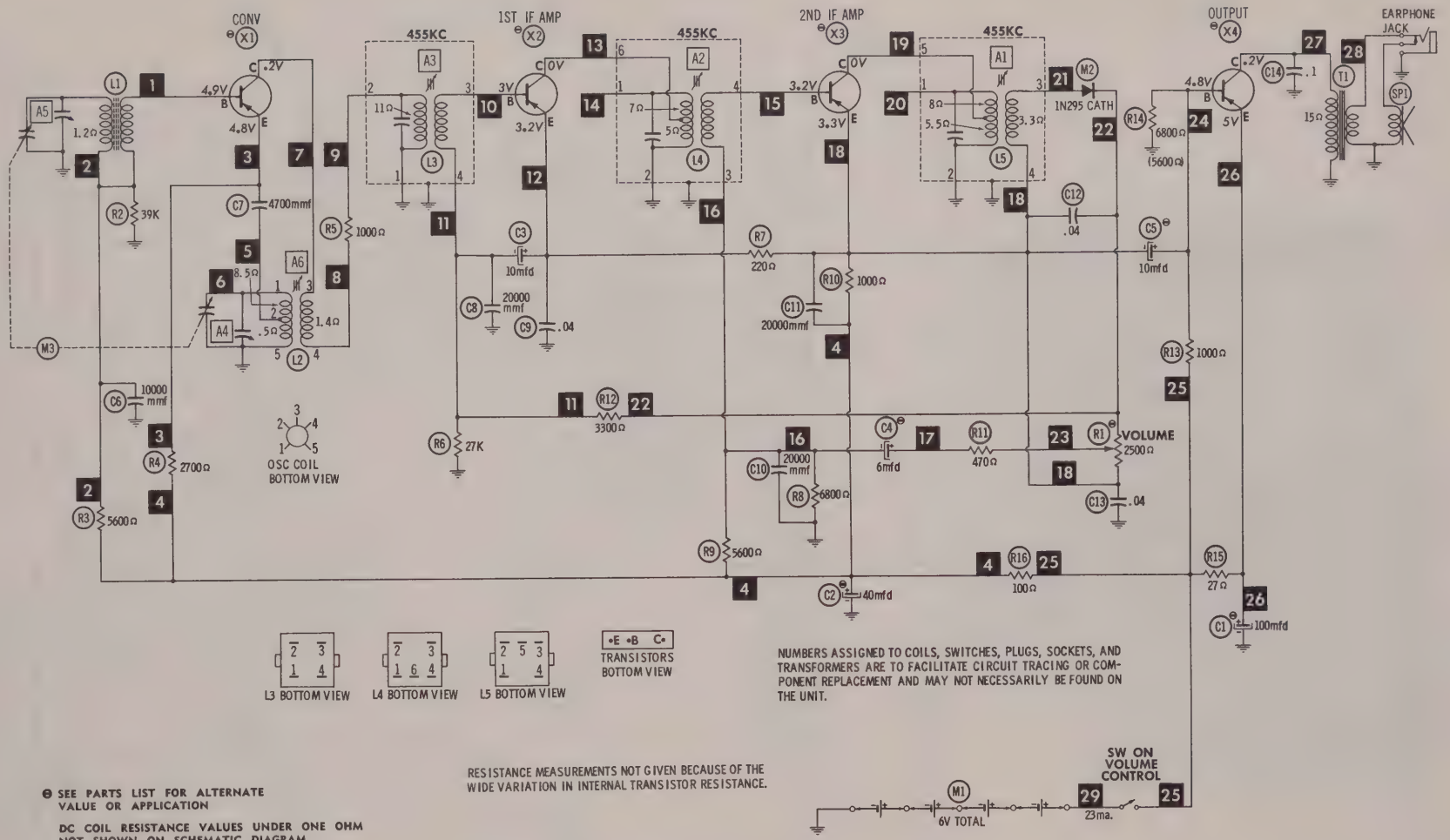
SET 470 FOLDER 9



NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

RESISTANCE MEASUREMENTS NOT GIVEN BECAUSE OF THE WIDE VARIATION IN INTERNAL TRANSISTOR RESISTANCE.

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

1. DC voltage measurements taken with vacuum tube voltmeter.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
5. Volume control at maximum, no signal applied for voltage measurements.

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EMERSON MODEL 555 (Ch. 120457)

PARTS LIST AND DESCRIPTIONS

TRANSISTORS

ITEM No.	PART NUMBER	USE	REPLACEMENT DATA				NOTES
			CBS PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	815041A①	Converter			2N486		PNP
X2	815042B②	1st IF Amplifier			2N483		PNP
X3	815043B③	2nd IF Amplifier			2N484		PNP
X4	815044A④	Output			2N631		PNP

① Alternate Emerson Part #815041B.
② Alternate Emerson Part #815042A.
③ Alternate Emerson Part #815043A.
④ Alternate Emerson Part #815044B.

NOTE: Transistors are not to be substituted between groupings. Use type designated to its particular group.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	EMERSON PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1	100	10	925466B	SRE12V100	NLW265	TT15X100	ML100-15	TE-1119.3	Note 1
C2	40	10	925466A	XPP-10040	NLW262	TT10X50	ML40-10	TE-1133	Note 1
C3	10	3	925464	PWE3010	EC10-3	TT3X10	ML10-6	TE-1053	
C4	6	12		XPP-12006	NLW277	TT25X8	ML6-15	TE-1127.1	Note 2
C5	10	12		XPP-12010	NLW279	TT12X10	ML10-15	TE-1128	Note 3

Note 1 Some versions may replace C1 and C2 with a dual unit, 80-40mfd@10V(Part #925466).
Note 2. Some versions may use 5mfd@3V in this application (Part #925465).
Note 3. Some versions may use 10mfd@3V in this application (Part #925467).

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C6	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C7	4700		BPD-0047	DD-472	BYA10D47M	CCD-472	B-247	5HK-D47
C8	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S2
C9	.04 50V		V84C6S4	DD-403	BYB6S4	DP-2-403	GEM-414	4TM-S4
C10	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S2
C11	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S2
C12	.04 50V		V84C6S4	DD-403	BYB6S4	DP-2-403	GEM-414	4TM-S4
C13	.04 50V		V84C6S4	DD-403	BYB6S4	DP-2-403	GEM-414	4TM-S4
C14	.1 50V		V84C2P1		CUB2P1	DP-2-104	GEM-201	2TM-P1

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	EMERSON PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A B	2500Ω Switch	½	390581 ①					Volume Power Off-On

① Alternate Part #390584

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R2	39K	
R3	5600Ω	
R4	2700Ω	
R5	1000Ω	
R6	27K	

ITEM No.	RATING	REMARKS
R7	220Ω	
R8	6800Ω	
R9	5600Ω	
R10	1000Ω	
R11	470Ω	

ITEM No.	RATING	REMARKS
R12	3300Ω	
R13	1000Ω	
R14	6800Ω	(5600Ω) *
R15	27Ω	
R16	100Ω	

* Alternate Value.

PRINTED BOARD

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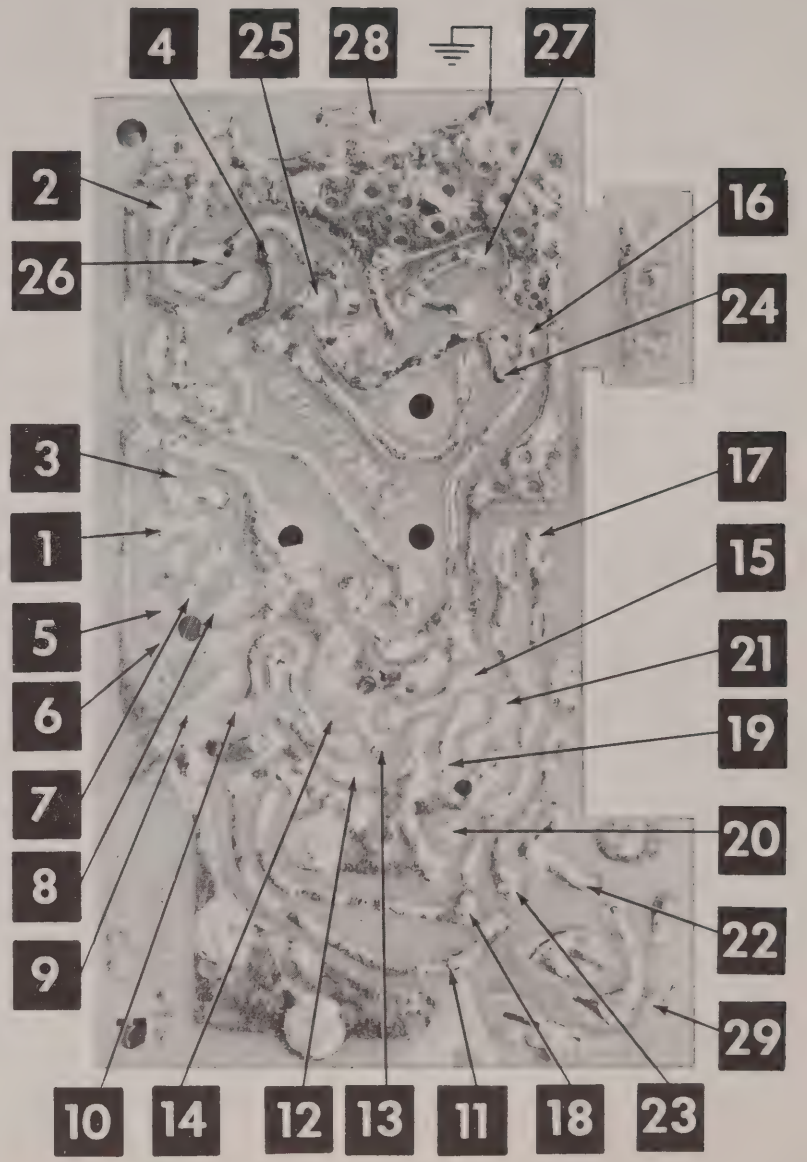


PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		EMERSON PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	Loopstick	700145						
L2	Osc. Coil	716129						
L3	1st IF Trans.	720342						
L4	2nd IF Trans.	720343						
L5	3rd IF Trans.	720344						

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	EMERSON PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	275Ω	3-4Ω	734179							

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	EMERSON PART No.	QUAM PART No.	
SP1	3"	PM	3-4Ω	180190		

BATTERIES

ITEM No.	VOLTAGE	EMERSON PART No.	REPLACEMENT DATA						NOTES
			BURGESS		EVEREADY		MALLORY		
			"A"	"B"	"A"	"B"	"A"	"B"	
M1	1.5V			930		915		M-15R	4 Required

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA				NOTES
		EMERSON PART No.	CBS PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
M2	1N295	817069	1N60	1N295	1N295	Detector (Pigtail)

MISCELLANEOUS

ITEM No.	PART NAME	EMERSON PART No.	NOTES
M3	Tuning Cap	900186	2 Gang

CABINETS & CABINET PARTS

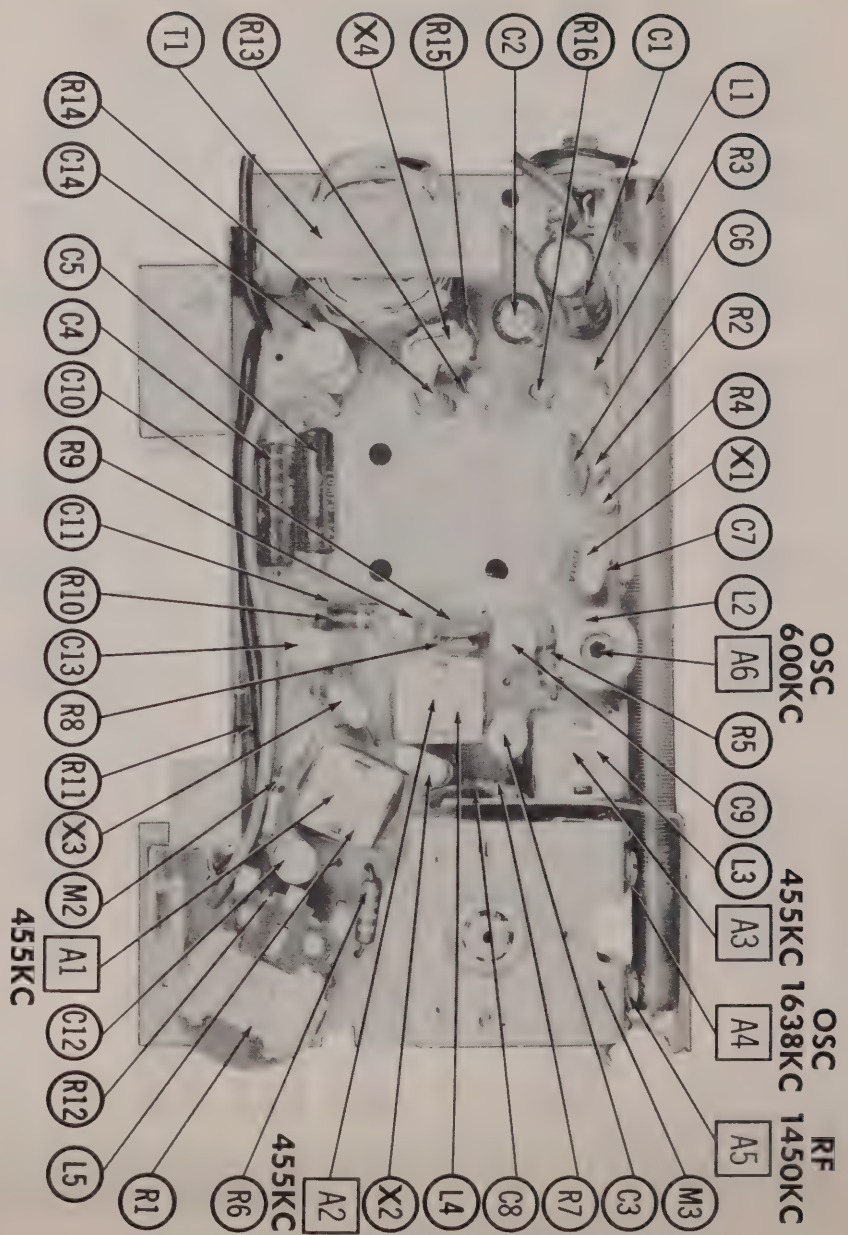
(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	461073	Tuning
Knob	461072	Volume
Dial Pointer	525082	
Cabinet	962473	Complete

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

CHASSIS—TOP VIEW

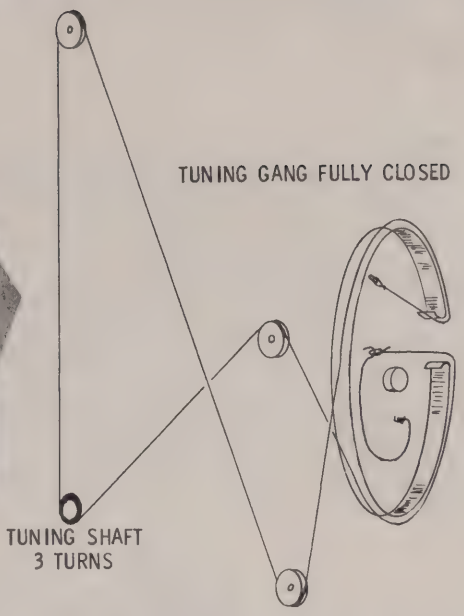


PHOTOFACT® Folder with CIRCUITRACE*

EIA MEMBER

GENERAL ELECTRIC MODEL RP1160A

GENERAL ELECTRIC
MODEL RP1160A



DIAL CORD STRINGING

GENERAL ELECTRIC
MODEL RP1160A

TRADE NAME	General Electric Model RP1160A
MANUFACTURER	General Electric Co., Product Service, Radio Receiver Dept., 869 Broad Street, Utica, N.Y.
TYPE SET	AC Operated 5 Tube AM Receiver with 4 Speed Automatic Record Changer
POWER SUPPLY	105-120 Volts AC, 60 Cycles — RATING 49 Watts, .48 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	535-1620KC

FOR SERVICE INFORMATION ON RECORD CHANGER CH14 - SEE SIMILAR V-M 1201 - PHOTOFACT SET 436 FOLDER 18.

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested Alignment Tools:
A1 thru A4 .... GENERAL CEMENT #8282, 8606, 8606L, 9091
WALSCO #2526, 2541, 2543, 2544
A5, A6 ..... GENERAL CEMENT #5004, 5008, 5009
WALSCO #2520

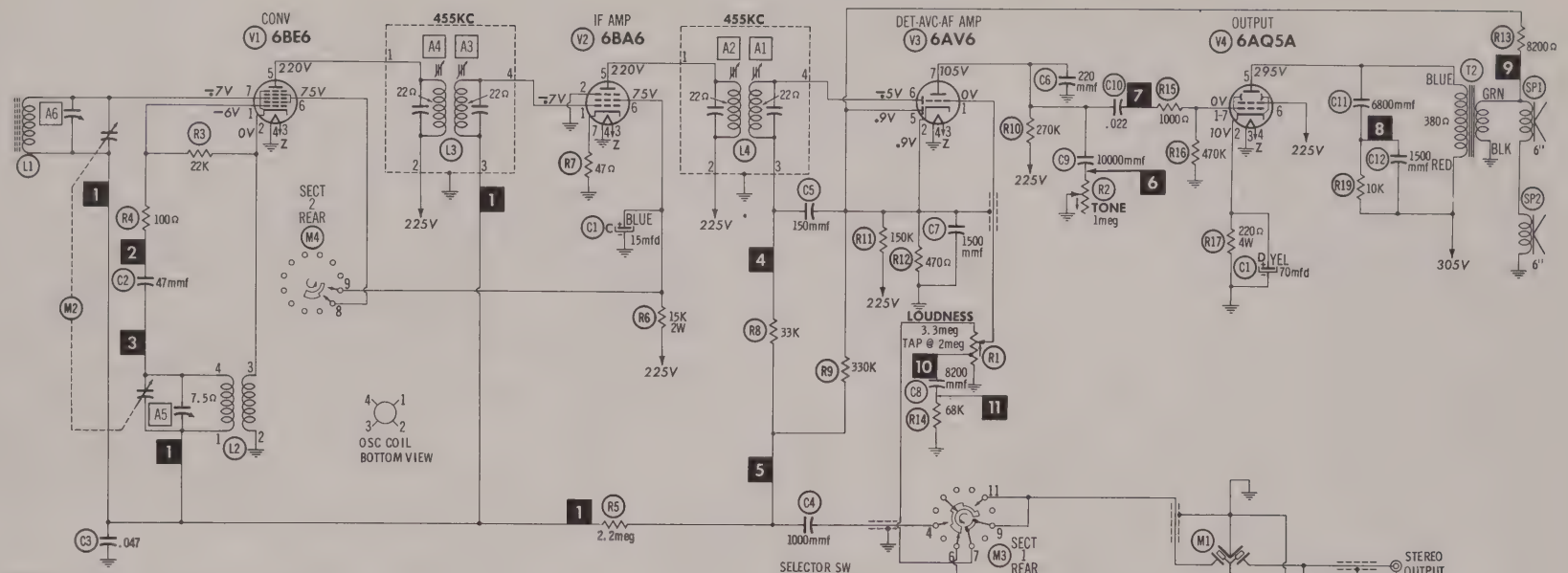
	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.05mfd	High side to pin 7 (grid) of Converter. Low side to chassis.	455KC (400∿ Mod)	Tuning gang fully open	Across Voice Coil	A1, A2, A3, A4	Adjust for maximum output.
2.		Loop	1620KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		"	1500KC	Tune to 1500KC signal	"	A6	Adjust for maximum output while rocking tuning gang.

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

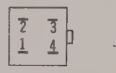
The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of JP438

the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1960 Howard W. Sams & Co., Inc., Indianapolis 6, Indiana. Printed in U.S. of America

SET 470 FOLDER 10



NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.



L3 & L4 BOTTOM VIEW

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V1	6BE6	22K	.6Ω	.2Ω	0Ω	†3300Ω	†18K	2.5meg	
V2	6BA6	2.5meg	0Ω	.2Ω	0Ω	†3300Ω	†18K	47Ω	
V3	6AV6	0Ω	470Ω	.2Ω	0Ω	470Ω	360K	†270K	
V4	6AQ5A	470K	220Ω	0Ω	.2Ω	†380Ω	†3300Ω	470K	
V5	5Y3GT	NC	¶	NC	100Ω	NC	98Ω	NC	¶

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
† MEASURED FROM PIN 2 OF V5.
NC NO CONNECTION.
⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

A PHOTOFACT STANDARD NOTATION SCHEMATIC
with CIRCUITRACE'

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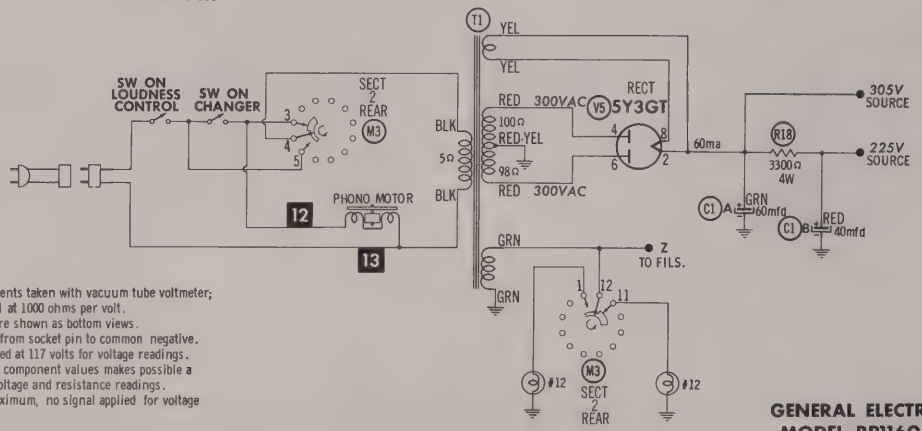
1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.



GENERAL ELECTRIC MODEL RP1160A

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	Converter	6BE6	V4	Output	6AQ5A
V2	IF Amplifier	6BA6	V5	Rectifier	5Y3GT
V3	Det.-AVC-AF Amp.	6AV6			

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA G E PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	60	400	RS-1788	PR4-700	BBRQ0805	WQ650		TVA-4705	
B	40	300							
C	15	150							
D	70	25							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C2	47		DI-47	DD-470	L10Q47	CM-20B-470M	GP447	5GA-Q47
C3	.047 400V		P488N-047	DD-503	CUB4S47	4CP-4-473	GEM-4147	4TM-S47
C4	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C5	150		DI-150	DD-151	L10T15	CM-20B-151M	B-315	5GA-T15
C6	220		DI-220	DD-221	L10T22	CCD-221	B-322	5GA-T22
C7	1500		BPD-0015	DD-152	BYA10D15	CCD-152	B-215	5HK-D15
C8	8200			DD-822	1D5D82	CCD-822	B-282	
C9	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C10	.022 400V		P488N-022		CUB4S22	4CP-2-223	GEM-4122	4TM-S22
C11	6800		BPD-0068	DD-682	BYA10D68	CCD-682	B-268	5HK-D68
C12	1500		BPD-0015	DD-152	BYA10D15	CCD-152	B-215	5HK-D15

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA G E PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	3.3meg 2meg Tap	½	RS-1783				PP36DT26 †	Volume
B	Switch							Power Off-On
R2A	1meg	½	RS-1784	B-70	A47-1meg-Z	Q13-137	U53	
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	

† Do not used tap #1.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R3	22K	
R4	100Ω	
R5	2.2meg	
R6	15K 2W	
R7	47Ω	
R8	33K	

ITEM No.	RATING	REMARKS
R9	330K	
R10	270K	
R11	150K	
R12	470Ω	
R13	8200Ω	
R14	68K	

ITEM No.	RATING	REMARKS
R15	1000Ω	
R16	470K	
R17	220Ω 4W	#RS-1822
R18	3300Ω 4W	#RS-1782
R19	10K	

Part Number.

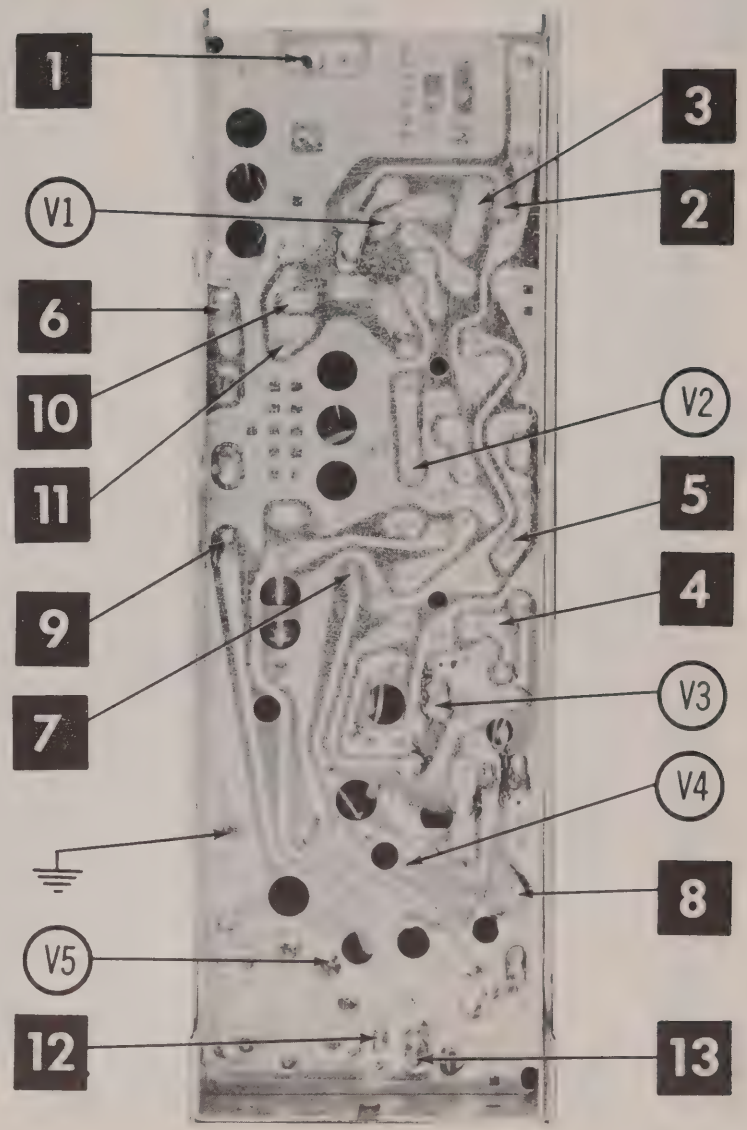
COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA G E PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	NOTES
L1	Loopstick	RS-1797						
L2	Osc. Coil	RS-1796						
L3	Input IF	RS-1143	16-6780	16-6780	BC-356	13-PC9	RF-4	
L4	Output IF	RS-1143	16-6780	16-6780	BC-357	13-PC10	RF-4	

PRINTED BOARD

A Howard W. Sams CIRCUITRACE® Photo

ARROWS INDICATING TUBE LOCATIONS ARE POINTING TO PIN 1 UNLESS OTHERWISE INDICATED



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA						
	PRI.	SEC. 1	SEC. 2	G E PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V @ .48A	600VCT @ .060A	5V @ 2A	RS-1794						
	SEC. 3	SEC. 4	SEC. 5							
	6.3V @ 1.5A									

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	G E PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	9000Ω	6-8Ω	RS-1793	24S64	A-2901	AU-604	A-3849	24S64	S-53X	

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	G E PART No.	QUAM PART No.	
SP1	6"	PM	3-4Ω	RB-1054	6A15	
SP2	6"	PM	3-4Ω	RB-1054	6A15	

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA								
	G E PART No.	ASTATIC PART No.		ELECTRO-VOICE PART No.		JENSEN PART No.		SONOTONE PART No.	
		CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE
M1	RS-165ls	†13TB	Not Req.	* 66	Not Req.			†10T2-S	Not Req.

† Includes mount. * Use mount PT-3.

MISCELLANEOUS

ITEM No.	PART NAME	G E PART No.	NOTES
M2	Tuning Cap.	RS-1787	2 Gang
M3	Switch	RS-1789	Function Selector

CABINETS & CABINET PARTS

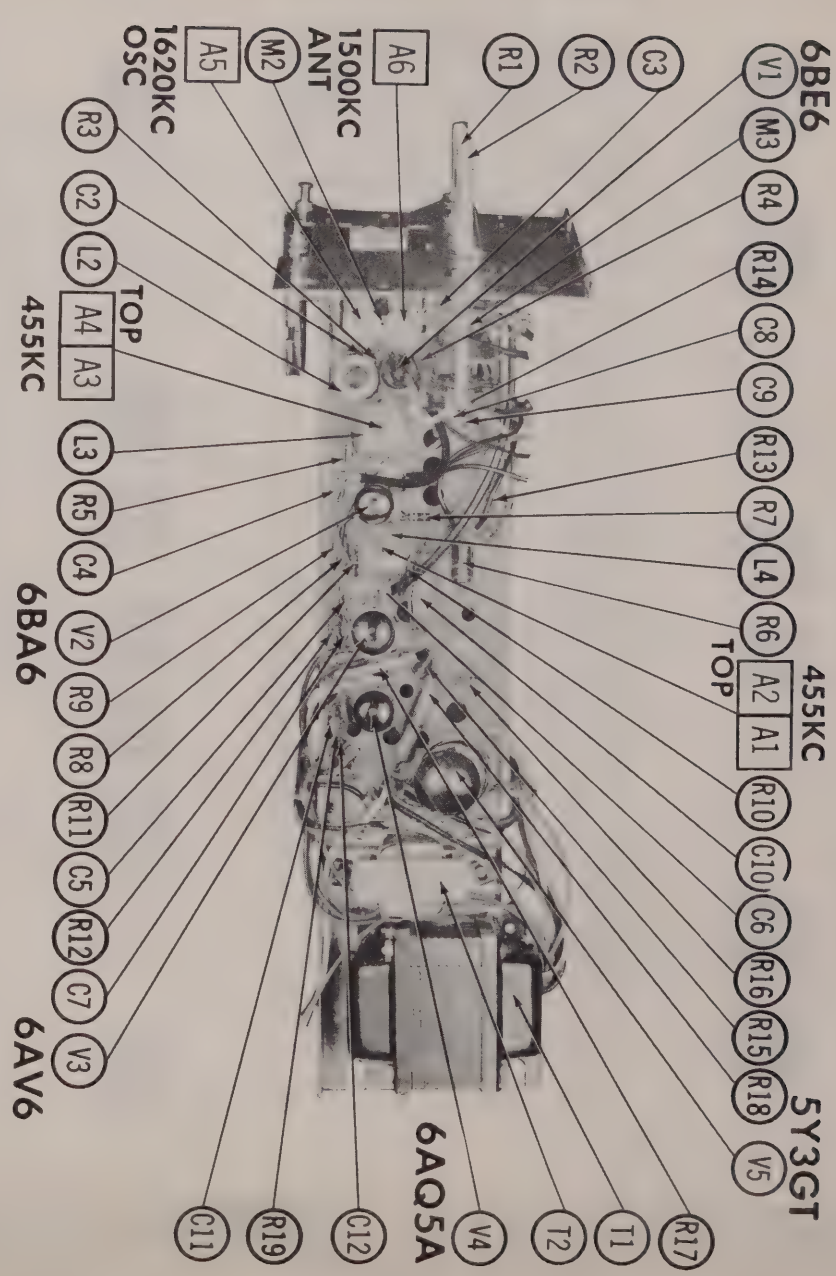
(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	RS-1777	Tuning
Knob	RS-1776	Loudness, Tone
Knob	RS-1778	Function Selector
Pointer	RS-1775	
Crystal	RS-1773	
Dial Back	RS-1774	

WIRING DATA

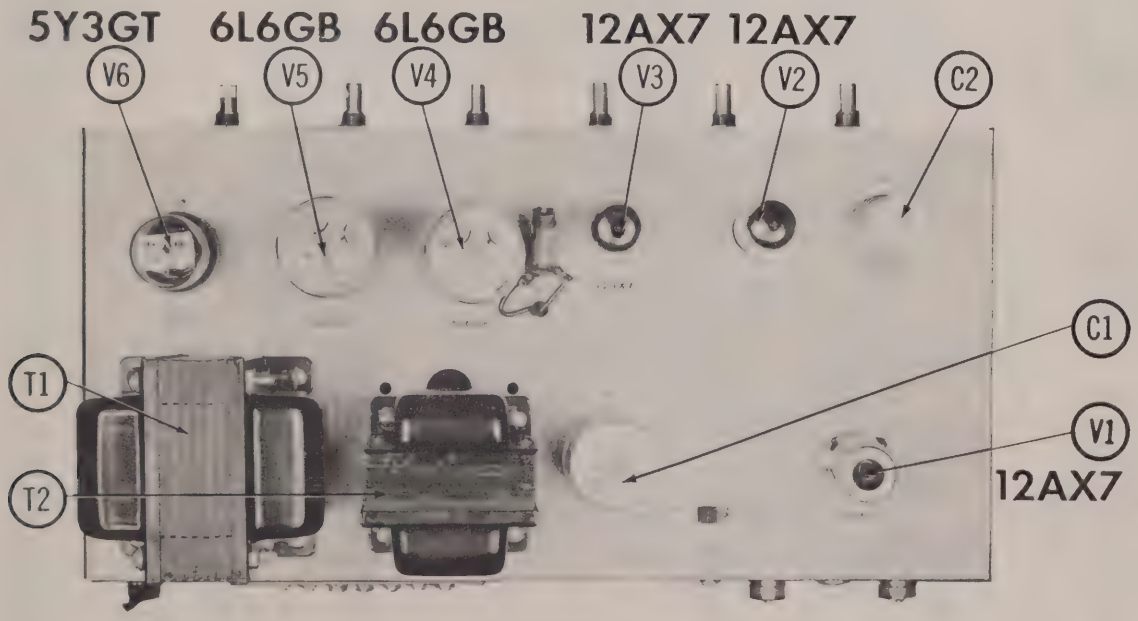
General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord	Use BELDEN No. 1765-B (6 Ft. Length) 1725-K (7½ Ft. Length)
Low-Loss Shielded Lead (Interconnecting)	Use BELDEN No. 8401
Phono Pick-up Arm Cable	Use BELDEN No. 8430 (Two Conductor - Twisted)

CHASSIS—TOP VIEW



PHOTOFACT® Folder

TRADE NAME	Grommes Model G-20
MANUFACTURER	Precision Electronics, Inc., 9101 King Ave., Franklin Park, Illinois
TYPE SET	AC Operated 6 Tube Audio Amplifier
POWER SUPPLY	110-120 Volts AC, 60 Cycles RATING 75 Watts, .77 Amp. @117 Volts AC



GROMMES
MODEL G-20

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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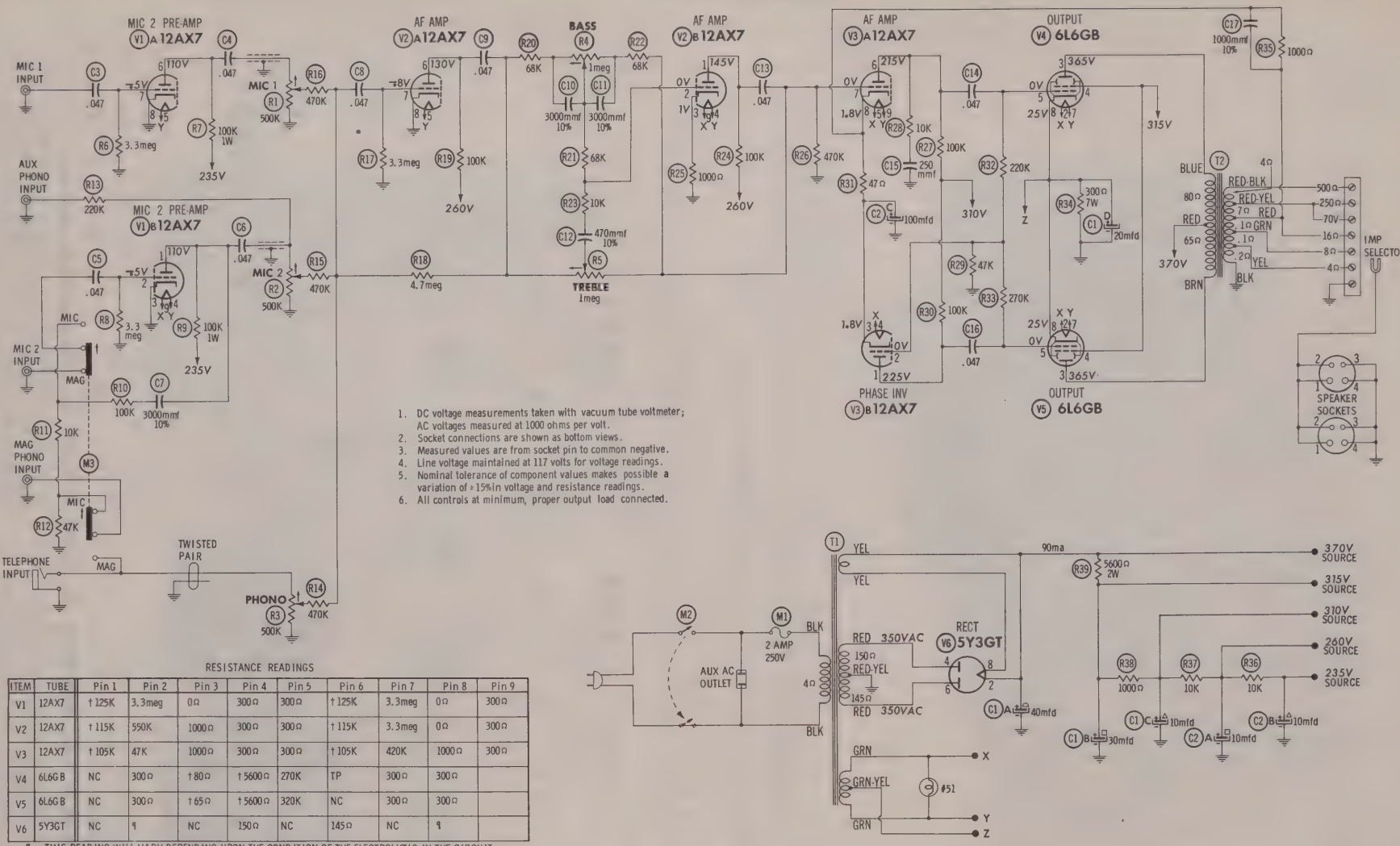
SET 470 FOLDER 11



1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12AX7	†125K	3.3meg	0Ω	300Ω	300Ω	†125K	3.3meg	0Ω	300Ω
V2	12AX7	†115K	550K	1000Ω	300Ω	300Ω	†115K	3.3meg	0Ω	300Ω
V3	12AX7	†105K	47K	1000Ω	300Ω	300Ω	†105K	420K	1000Ω	300Ω
V4	6L6GB	NC	300Ω	†80Ω	†5600Ω	270K	TP	300Ω	300Ω	
V5	6L6GB	NC	300Ω	†65Ω	†5600Ω	320K	NC	300Ω	300Ω	
V6	5Y3GT	NC	¶	NC	150Ω	NC	145Ω	NC	¶	

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
† MEASURED FROM PIN 2 OF V6.
NC NO CONNECTION
TP TIE POINT

Θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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GROMMES
MODEL G-20

CHASSIS BOTTOM VIEW

GROMMES
MODEL G-20

PARTS LIST AND DESCRIPTIONS

WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord	Use BELDEN No. 1765-B (6 Ft. Length) 1725-K (7½ Ft. Length)

TUBES

• CBS • GENERAL ELECTRIC • RAYTHEON • SYLVANIA •

ITEM No.	USE	TYPE
V1	Mic #1 Preamp. -Mic #2 Preamp.	12AX7
V2	AF Amplifier	12AX7
V3	AF Amp. -Phase Inv.	12AX7
V4	Output	6L6GB
V5	Output	6L6GB
V6	Rectifier	5Y3GT

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA GROMMES PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	▲40	450		AFH4-78	D0640	FP429	TMQ-92	TVL-4734	
B	■30	350							
C	▲10	300							
D	20	25							
C2A	■10	250		AFH3-156	C1120	FP387	TMT-155	TVL-3926	
B	▲10	250							
C	100	15							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C3	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C4	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C5	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C6	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C7	3000 10%		DI-3000		1R5D3	CCS-302	MCB461	MS-23
C8	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C9	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C10	3000 10%		DI-3000		1R5D3	CCS-302	MCB461	MS-23
C11	3000 10%		DI-3000		1R5D3	CCS-302	MCB461	MS-23
C12	470 10%		DI-470	MD-471	5R5T47	CCD-471	JL-347	MS-347
C13	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C14	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C15	250		DI-250	DD-251	L10T25	CCD-251	UC-5325	5GA-T25
C16	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C17	1000 10%		DI-1000		PM6D1	CCS-102	JL-210	MS-21

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA GROMMES PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500K	½	GVC-500K	B-60	A47-500K-Z	Q13-133	U48	Mic 1
B	Shaft			Not Req.	RS-2	Not Req.	Not Req.	
R2A	500K	½	GVC-500K	B-60	A47-500K-Z	Q13-133	U48	Mic 2
B	Shaft			Not Req.	RS-2	Not Req.	Not Req.	
R3A	500K	½	GVC-500K	B-60	A47-500K-Z	Q13-133	U48	Phono
B	Shaft			Not Req.	RS-2	Not Req.	Not Req.	
R4A	1meg	½	GTC-1meg	B-69	A47-1meg-S	Q11-137	U54	Bass
B	Shaft			Not Req.	RS-2	Not Req.	Not Req.	
R5A	1meg	½	GTC-1meg	B-69	A47-1meg-S	Q11-137	U54	Treble
B	Shaft			Not Req.	RS-2	Not Req.	Not Req.	

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R6	3.3meg	
R7	100K 1W	
R8	3.3meg	
R9	100K 1W	
R10	100K	
R11	10K	
R12	47K	
R13	220K	
R14	470K	
R15	470K	
R16	470K	
R17	3.3meg	

ITEM No.	RATING	REMARKS
R18	4.7meg	
R19	100K	
R20	68K	
R21	68K	
R22	68K	
R23	10K	
R24	100K	
R25	1000Ω	
R26	470K	
R27	100K	
R28	10K	
R29	47K	

ITEM No.	RATING	REMARKS
R30	100K	
R31	47Ω	
R32	220K	
R33	270K	
R34	300Ω 7W	
R35	1000Ω	
R36	10K	
R37	10K	
R38	1000Ω	
R39	5600Ω 2W	

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	RATING SEC. 4	RATING SEC. 5	REPLACEMENT DATA GROMMES PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V@ .77A	700 VCT @.090A	5V@ 2A	6.3 VCT @ 2.8A			TP3U-P	24R40U①			PC8409①	24R40U①	R-11A①

① Drill New Mounting Holes.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA GROMMES PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T2	4500Ω CT	500Ω Taps@ 250Ω (70V) 16Ω, 8Ω, 4Ω	TO-25	24S77	A-3131		A-3800	24S77	S-60A①	①Drill New Mounting Holes

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA GROMMES PART No. FUSE	GROMMES PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M1	3AG	2A 250V			312002 (3AG 2A 250V)	342001	MDX2	HKP

MISCELLANEOUS

ITEM No.	PART NAME	GROMMES PART No.	NOTES
M2	Switch		Off-On
M3	Switch		Crystal-Magnetic (DPDT Slide Type)

PHOTOFACT® Folder

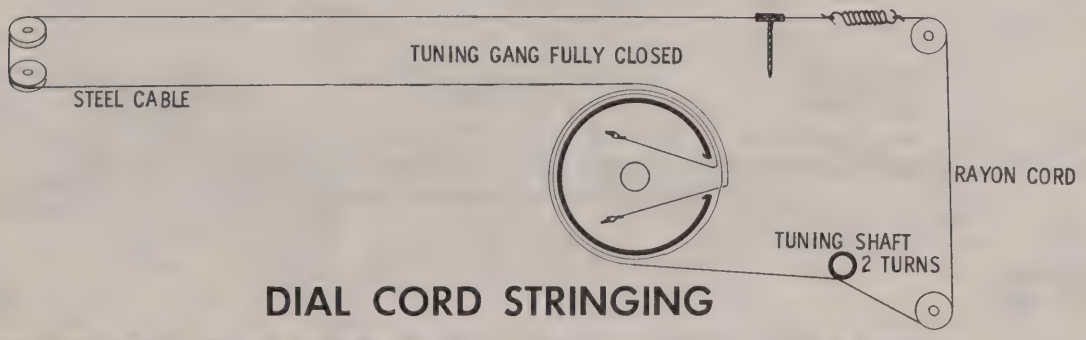
GRUNDIG MAJESTIC
MODEL K12St/US

GRUNDIG MAJESTIC
MODEL K12St/US

GRUNDIG MAJESTIC
MODEL K12St/US

TRADE NAME	Grundig Majestic Model K12 St/US		
IMPORTER	Majestic International Sales, 743 N. LaSalle Street, Chicago 10, Illinois		
TYPE SET	AC Operated 6 Tube FM-BC-SW Receiver With 4 Speed Automatic Record Changer		
POWER SUPPLY	110-120 Volts (or) 220 Volts AC, 60 Cycles	RATING	45 Watts, .465 Amp. @ 117 Volts AC
TUNING RANGE	BROADCAST 540-1620KC FREQ. MOD. 88-108MC	SHORT WAVE I SHORT WAVE II	5.9-13MC 12.9-23MC

FOR SERVICE INFORMATION ON RECORD CHANGER - SEE SIMILAR TELEFUNKEN TW560 - PHOTOFACT SET 371 FOLDER 12 OR RECORD CHANGER MANUAL RC-10



DIAL CORD STRINGING

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of JN422

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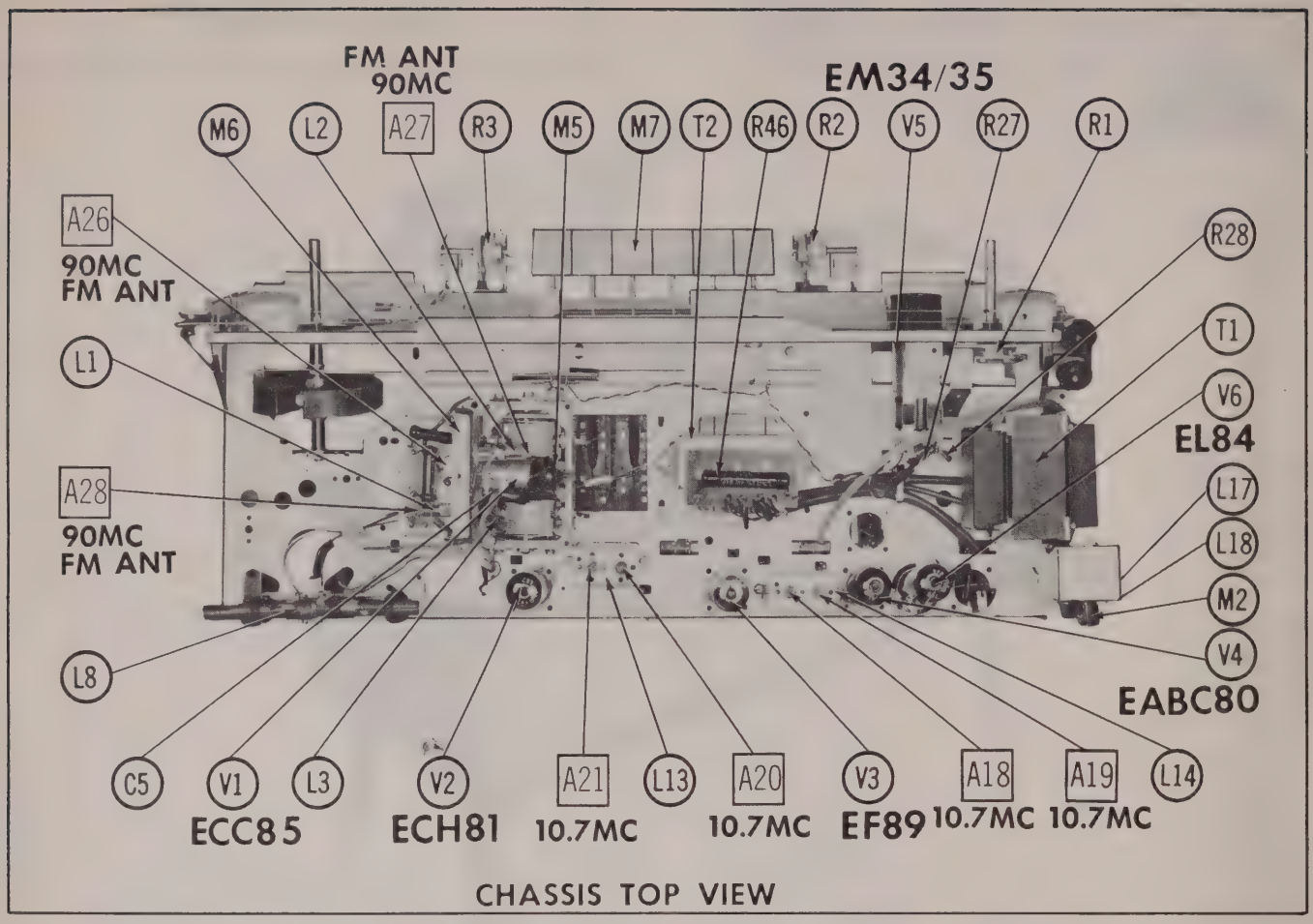
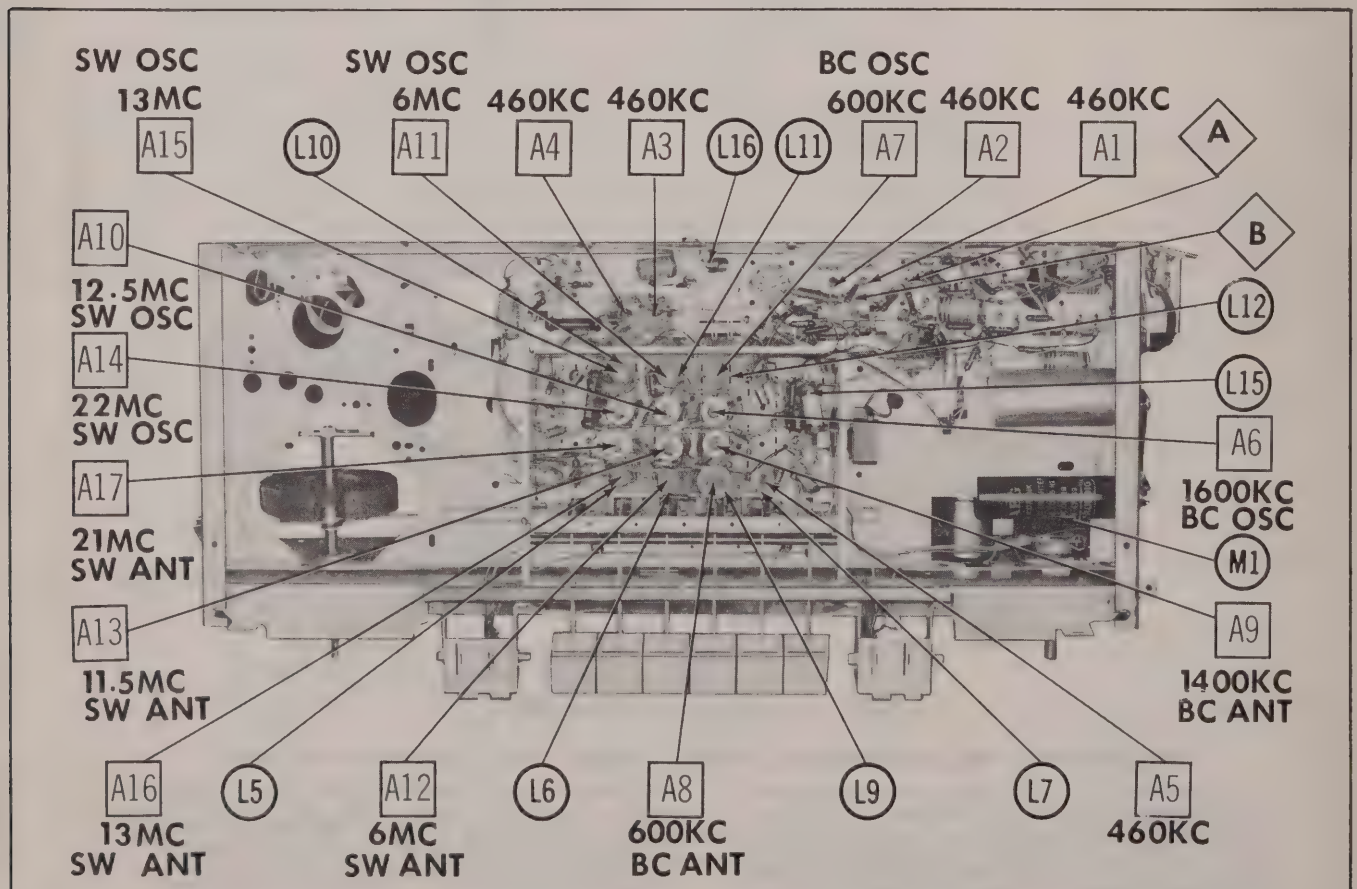
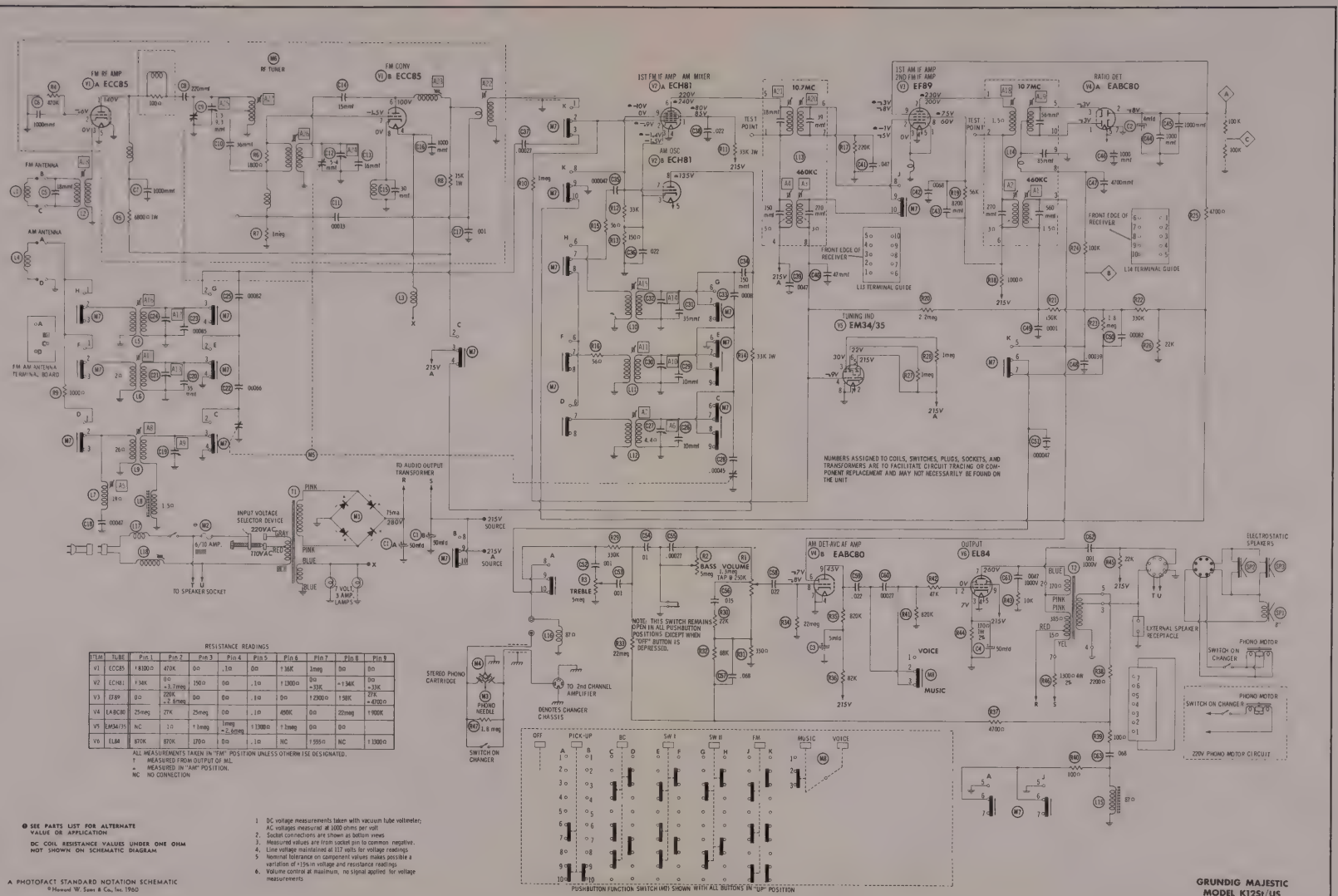
SET 470 FOLDER 12



CHASSIS TOP VIEW



CHASSIS BOTTOM VIEW-INDUCTOR AND ALIGNMENT IDENTIFICATION



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	ECC85	†8100Ω	470K	0Ω	.1Ω	0Ω	†1MK	1meg	0Ω	0Ω
V2	ECH81	†34K	0Ω -3.7meg	150Ω	0Ω	.1Ω	†1300Ω	0Ω -33K	†134K	0Ω -33K
V3	EF89	0Ω	220K -2.6meg	0Ω	0Ω	.1Ω	0Ω	†2300Ω	†58K	27K -6700Ω
V4	EABC80	25meg	27K	25meg	0Ω	.1Ω	450K	0Ω	22meg	†900K
V5	EM34/35	NC	1Ω	1meg	1meg -2.6meg	†1300Ω	†2meg	0Ω	0Ω	
V6	EL84	870K	870K	170Ω	0Ω	.1Ω	NC	†555Ω	NC	†1300Ω

ALL MEASUREMENTS TAKEN IN "FM" POSITION UNLESS OTHERWISE DESIGNATED.
† MEASURED FROM OUTPUT OF ML.
- MEASURED IN "AM" POSITION.
NC NO CONNECTION

● SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt
2. Socket connections are shown as bottom views
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings
6. Volume control at maximum, no signal applied for voltage measurements

NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT

GRUNDIG MAJESTIC MODEL K12SI/US

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested Alignment Tools:
A1 thru A5, A7, A9, A11, A13, A15, A17 thru A23, A25, A27, A28 ..... GENERAL CEMENT #8282, 8606, 8606L, 9295; WALSCO #2526, 2543, 2544, 2545
A24, A26 ..... GENERAL CEMENT #5009, 8195, 8274, 8275, 8728, 8987; WALSCO #2531

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.01mfd	High side to pin 2 (grid) of AM Mixer. Low side to chassis.	460KC (40% Mod.)	BC	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output.
2.	"	High side to AM antenna terminal. Low side to chassis.	"	"	"	"	A5	Adjust for MINIMUM output.
3.	"	"	1600KC	"	1600KC	"	A6	Adjust for maximum output.
4.	"	"	600KC	"	600KC	"	A7, A8	Adjust for maximum output. Repeat steps 3 and 4.
5.	"	"	1400KC	"	1400KC	"	A9	Adjust for maximum output.
6.	200mmf	"	12.5MC	SW I	12.5MC	"	A10	"
7.	"	"	6.0MC	"	6.0MC	"	A11, A12	"
8.	"	"	11.5MC	"	11.5MC	"	A13	"
9.	"	"	22.0MC	SW II	22.0MC	"	A14	"
10.	"	"	13.0MC	"	13.0MC	"	A15, A16	"
11.	"	"	21.0MC	"	21.0MC	"	A17	"

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 100K (±1%) resistors in series from point (A) to chassis. The junction of these two resistors is alignment point (C) as shown on the schematic.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
12.	200mmf	High side to pin 2 (grid) of 2nd FM IF Amplifier. Low side to chassis.	10.7MC (Unmod.)	FM	Point of non-interference	DC probe to point (A). Common to chassis.	A18	Adjust for maximum deflection.
13.	"	"	"	"	"	DC probe to point (B). Common to point (C).	A19	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
14.	"	High side to pin 7 (grid) of FM Converter. Low side to chassis.	"	"	"	DC probe to point (A). Common to chassis.	A20, A21, A22, A23	Adjust for maximum deflection.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60% modulation and 450KC sweep. Use 120% sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
12.	200mmf	High side to pin 2 (grid) of 2nd FM IF Amplifier. Low side to chassis.	10.7MC (450KC Swp)	FM	Point of non-interference	Vert. Amp. to point (A). Low side to chassis.	A18	Disconnect stabilizing capacitor C2. Adjust for curve of maximum amplitude and symmetry similar to Fig. 1. Reconnect C2.
13.	"	"	"	"	"	Vert. Amp. to point (B). Low side to chassis.	A19	Adjust to place marker at the center of crossover lines similar to Fig. 2. SLIGHTLY retouch A18 for maximum amplitude and straightness of crossover lines.
14.	"	High side to pin 7 (grid) of FM Converter. Low side to chassis.	"	"	"	Vert. Amp. to point (A). Low side to chassis.	A20, A21, A22, A23	Disconnect C2. Adjust for maximum amplitude and symmetry similar to Fig. 1. Reconnect C2.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
15.	270Ω Carbon Resistor	Across FM antenna leads with 270Ω in high side.	105MC (Unmod.)	FM	105MC	DC probe to point (A). Common to chassis.	A24, A25	Adjust for maximum deflection.
16.	"	"	90MC	"	90MC	"	A26, A27, A28	Adjust for maximum deflection. Repeat steps 15 and 16.

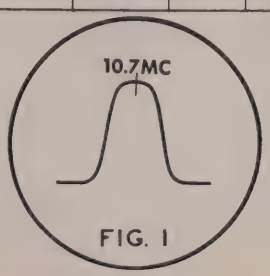


FIG. 1

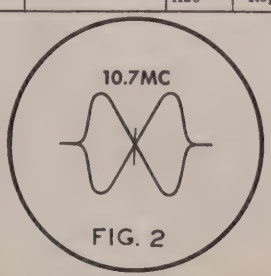
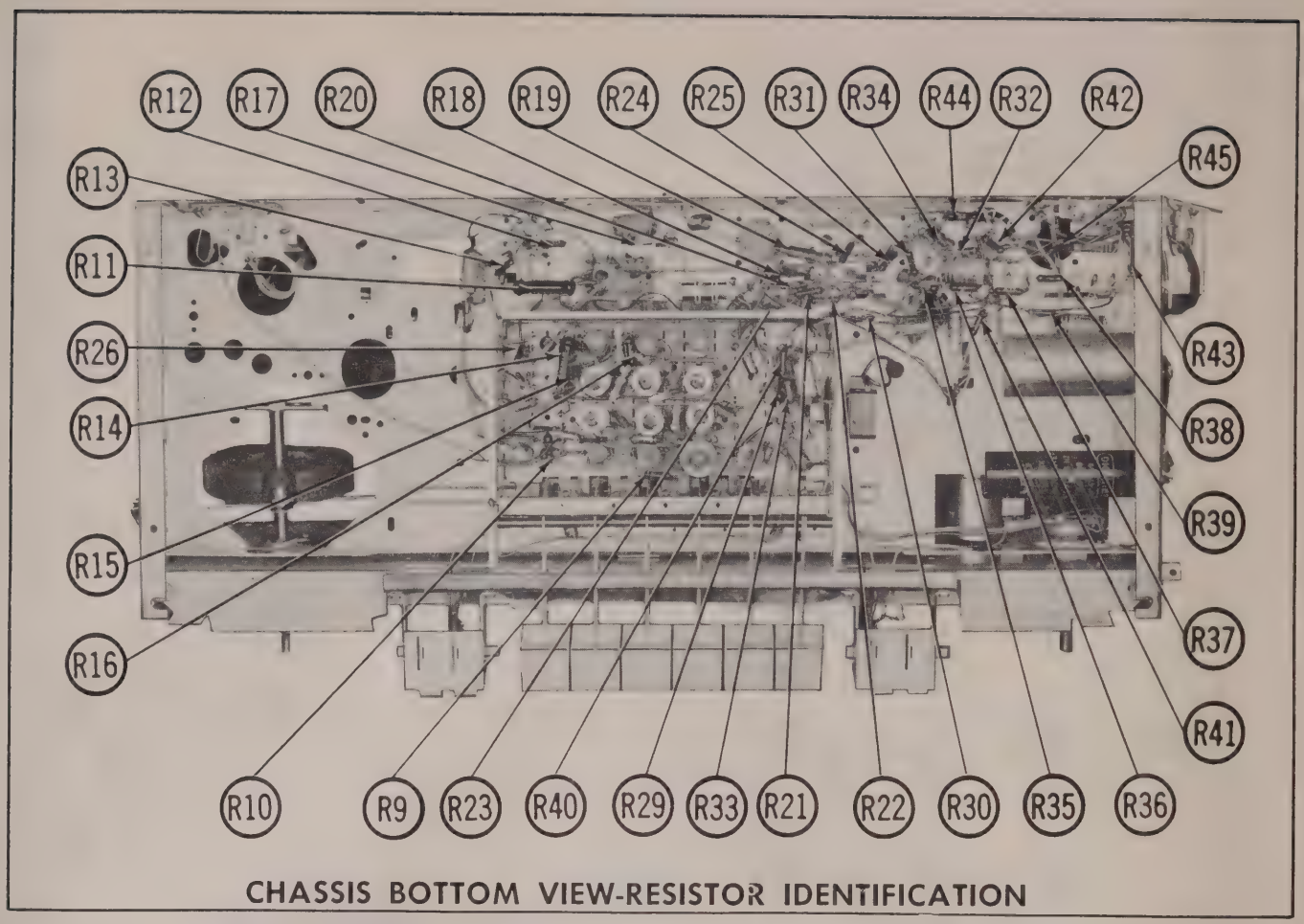
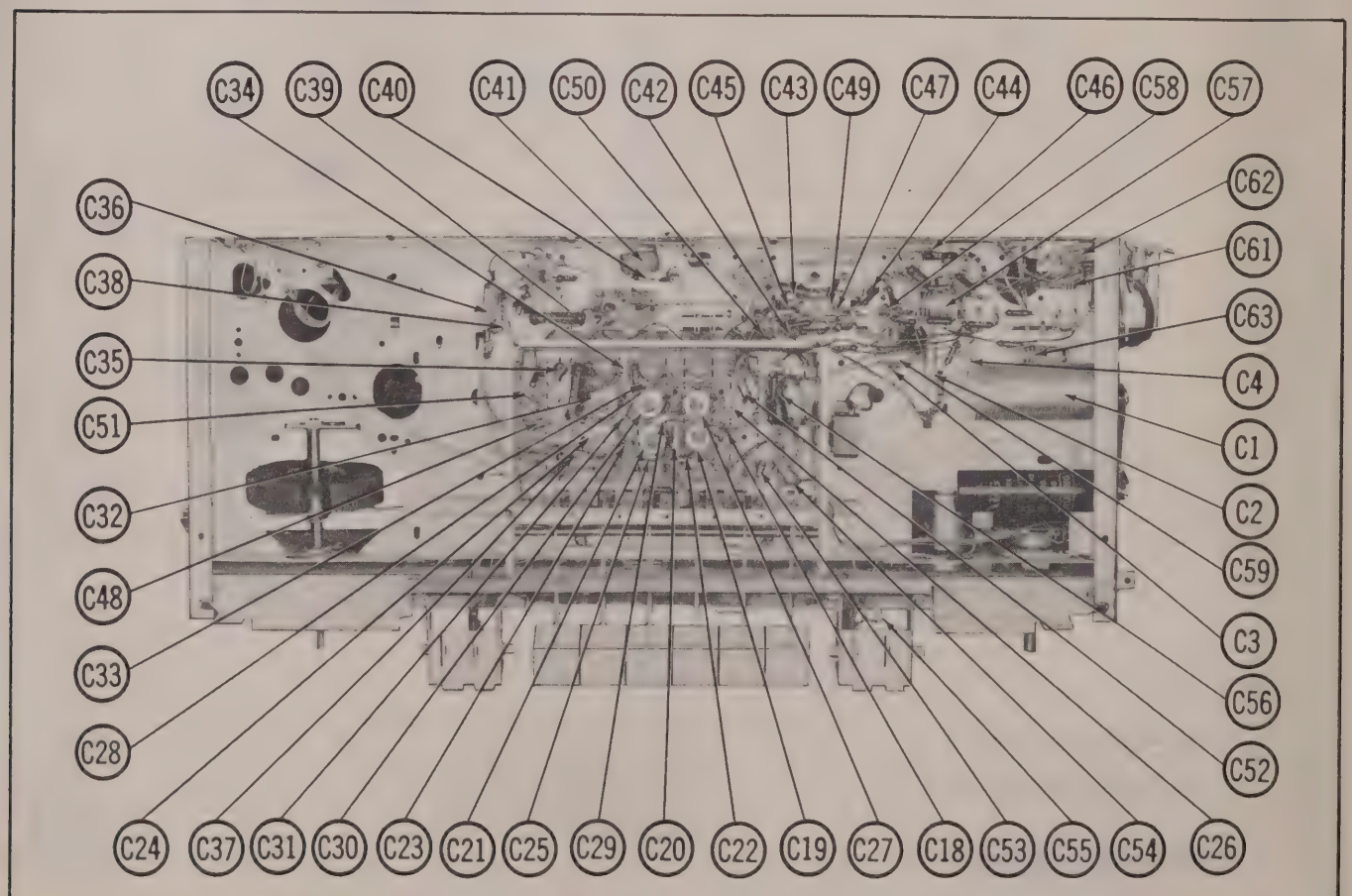


FIG. 2



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION



CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	FM RF Amp. - FM Conv.	ECC85	V4	FM Ratio Det. - AM Det. - AVC - AF Amp.	EABC80
V2	1st FM IF Amp. - AM Mixer - Osc.	ECH81	V5	Tuning Indicator	EM34/35
V3	2nd FM IF Amp. - 1st AM IF Amplifier	EF89	V6	Output	EL84

ELECTROLYTIC CAPACITORS

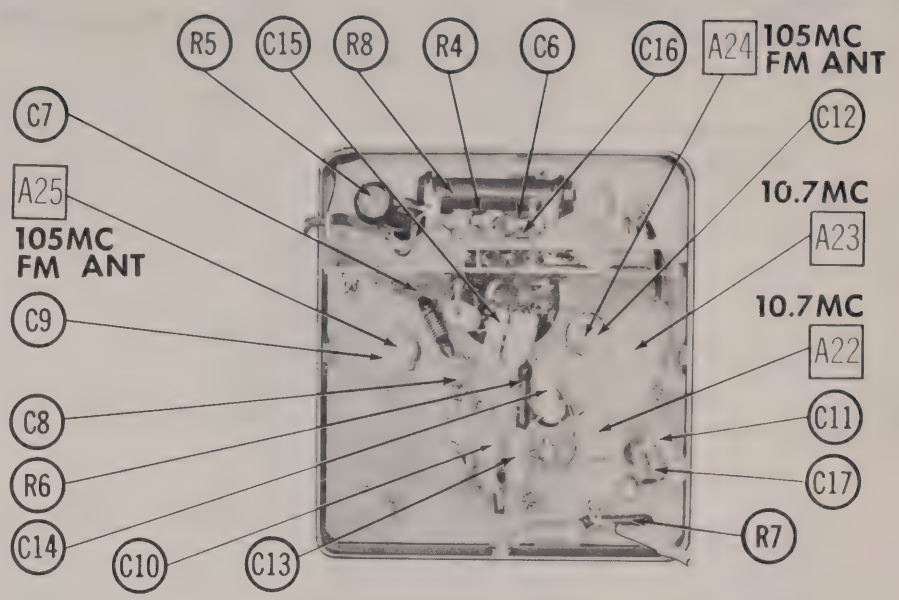
ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA GRUNDIG PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	50	350		PRS2420					
B	50	350							
C2	4	70		PRS1400	BBR4-150	TT80X4	TD-4-150	TE-1403	
C3	.5	350		PRS1700	BR145	TT350X2	TD-2-450	TE-1400	
C4	50	12		SRE25V50	BBR50-25	TT15X50	ML50-15	TVA-1206	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C5	18		SI 18	D6-180	L10Q18	CCD-180	UC-5418	5GA-Q18
C6	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C7	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C8	220		DI-220	DD-221	L10T22	CCD-221	B-322	5GA-T22
C9	1.3-9.3			829-10				
C10	36		NPO-SI 36	TCZ-36	C10Q36C	CCTO-360		
C11	.00013 500V			TCZ-130	L10T13			5GA-T13
C12	.5-4			829-4				
C13	16		NPO-SI 15	TCZ-15	C10Q15C	CCTO-150	CNO-415	5GA-Q15
C14	15		NPO-SI 15	TCZ-15	C10Q15C	CCTO-150	CNO-415	5GA-Q15
C15	30		NPO-SI 30	TCZ-30	C10Q3C	CCTO-300		5GA-Q30
C16	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C17	.001 500V		P688N-001	D6-102	CUB6D1	6DP-1-102	GEM-421	6TM-DI
C18	.00047 125V				BYA10T47	CCD-471	B-347	5GA-T47
C19								
C20	35		NPO-SI 36	TCZ-36	C10Q36C	CCTO-360		
C21								
C22	.00066 125V			D6-681	L10T68	CCD-681	B-368	5GA-T68
C23	.00085 125V							
C24								
C25	.00082 125V			D6-820	L10T82	CCD-821	B-382	5GA-T82
C26	10		NPO-SI 10	TCZ-10	C10Q1C	CCTO-100	CNO-410	10TCC-Q10
C27								
C28	.00045 125V			D6-471	L10T47	CCD-471	B-347	5GA-T47
C29	10		NPO-SI 10	TCZ-10	C10Q1C	CCTO-100	CNO-410	10TCC-Q10
C30								
C31	35		NPO-SI 36	TCZ-36	C10Q36C	CCTO-360		
C32								
C33	.0008 125V			D6-821	L10T8	CCD-821	B-382	5GA-T82
C34	150		NPO-SI 150	TCZ-150	L10T15	CCD-151	B-315	5GA-T15
C35	.000047 250V			TCZ-47	C10Q47C	CCD-470	UC-5447	5GA-Q47
C36	.022 250V		P488N-022		CUB4S22	4DP-2-223	GEM-4122	4TM-S22
C37	.00027 250V			TCZ-270	C10T27C	CCD-271	B-327	5GA-T27
C38	.022 500V		P688N-022		CUB4S22	4DP-2-223	GEM-4122	4TM-S22
C39	.0047 500V		P688N-0047	D6-472	CUB6D47	6DP-1-472	GEM-6247	6TM-D47
C40	47		NPO-SI 47	TCZ-47	C10Q47C	CCD-470	CNO-447	5GA-Q47
C41	.047 250V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C42	.0068 500V		P688N-0068	D6-682	CUB6D68	6DP-1-682	GEM-6268	6TM-D68
C43	8200			DD-822	HVE16D8	CCD-822	B-282	5BF-D82
C44	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C45	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C46	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C47	4700		SI 4700	D6-472	BYA10D47M	CCD-472	B-247	5HK-D47

FM RF SUB CHASSIS



FIXED CAPACITORS (cont)

ITEM No.	RATING	REMARKS	REPLACEMENT DATA AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C48	.00039 125V			D6-391	L10T39	CCD-391	B-339	5GA-T39
C49	.0001 125V		P688N-0001	D6-101	CUB6T1	CCD-101	CNO-310	6TM-T1
C50	.00082 125V			DD-821	L10T82	CCD-821	B-382	5GA-T82
C51	.000047 125V			DD-470	L10Q47	CCD-470	GP-447	5GA-Q47
C52	.001 125V		P288N-001	D6-102	CUB6D1	CCD-102	GEM-421	6TM-D1
C53	.001 125V		P288N-001	D6-102	CUB6D1	CCD-102	GEM-421	6TM-D1
C54	.01 250V		P488N-01	D6-103	CUB4S1	CCD-103	GEM-411	4TM-S1
C55	.00027 250V			D6-271	L10T27	CCD-271	B-327	5GA-T27
C56	.015 250V		P488N-015	DD16-153	CUB6S15	CCD-153	GEM-4115	4TM-S15
C57	.068 250V		P488N-068	DD16-702	CUB4S68	4DP-3-683	GEM-4168	4TM-S68
C58	.022 250V		P488N-022		CUB4S22	4DP-2-223	GEM-4122	4TM-S22
C59	.022 250V		P488N-022		CUB4S22	4DP-2-223	GEM-4122	4TM-S22
C60	.00027 125V			D6-271	L10T27	CCD-271	B-327	5GA-T27
C61	.0047 1000V		P1088N-0047	DD-472	CUB10D47	16DP-1-472	GEM-10247	10TM-D47
C62	.001 1000V		P1088N-001	DD-102	CUB10D1	16DP-1-102	GEM-1021	10TM-D1
C63	.068 250V		P488N-068	DD16-702	CUB4S68	4DP-3-683	GEM-4168	4TM-S68

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA GRUNDIG PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1	1.3meg 250K Tap	1/2	7801-038					Volume
R2	5meg	1/2	7806-182					Bass
R3	5meg	1/2	7806-180					Treble

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R4	470K	
R5	6800Ω 1W	
R6	1800Ω	
R7	1meg	
R8	15K 1W	
R9	1000Ω	
R10	1meg	
R11	33K 1W	
R12	33K	
R13	150Ω	
R14	33K 1W	
R15	56Ω	
R16	56Ω	
R17	220K	
R18	1000Ω	

ITEM No.	RATING	REMARKS
R19	56K	
R20	2.2meg	
R21	150K	
R22	330K	
R23	1.8meg	
R24	100K	
R25	4700Ω	
R26	22K	
R27	1meg	
R28	1meg	
R29	330K	
R30	22K	
R31	330Ω	
R32	68K	
R33	22meg	

ITEM No.	RATING	REMARKS
R34	22meg	
R35	820K	
R36	82K	
R37	4700Ω	
R38	2200Ω	
R39	100Ω	
R40	100Ω	
R41	820K	
R42	47K	
R43	10K	
R44	170Ω 1W 2%	
R45	22K	
R46	1300Ω 4W 2%	
R47	1.8meg	

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA: GRUNDIG PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	NOTES
L1	FM Antenna Coil	9238-071						
L2	FM Antenna Trans.	BV1974						
L3	Fil. Choke	9238-026	19-1001	19-1001	BC-562	4604		1.5uh
L4	AM Antenna Coil	9238-049						
L5	SW II Antenna Trans.	9232-017						
L6	SW I Antenna Trans.	9231-003						
L7	IF Trap Coil	9208-055						
L8	Loopstick	9233-021						
L9	BC Antenna Trans.	9208-059						
L10	SW II Osc. Coil	9232-006						
L11	SW I Osc. Coil	9231-002						
L12	BC Osc. Coil	BV1681						
L13A	2nd FM IF Trans.	7207-325						
B	1st AM IF Trans.							
L14A	Ratio Detector	7207-328						
B	2nd AM IF Trans.							
L15	Tone Choke	9217-009						28MH
L16	RF Choke	9238-059						1.2uh
L17	Line Choke	9227-004						1.7uh
L18	Line Choke	9227-005						1.5uh

TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	SEC. 1	SEC. 2	REPLACEMENT DATA: GRUNDIG PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	220V tap @ 117V @ .465A	240VAC @ .075A	6V @ 2.7A	9078-024						

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI.[1]	SEC.	REPLACEMENT DATA: GRUNDIG PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T2	5300Ω Tap @ 3% PRI.[2] 1500Ω	5Ω Tap @ 3Ω	9066-047							

SPEAKER

ITEM No.	TYPE: SIZE	FIELD	V. C. IMP.	REPLACEMENT DATA: GRUNDIG PART No.	QUAM PART No.	NOTES
SP1	8"	PM	5-6Ω	7046-001-002		
SP2	Electrostatic			7082-002		
SP3	Electrostatic			7082-002		

RECTIFIERS

ITEM No.	RATING: CURRENT (Measured)	REPLACEMENT DATA: GRUNDIG PART No.	INTERNATIONAL PART No.	ITT PART No.	SARKES TARZIAN PART No.	SYLVANIA PART No.	NOTES
M1	.075A	B250C75N2 ①	60-4037 ①		D-64 ①		① Selenium Type

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA: GRUNDIG PART No. FUSE	GRUNDIG PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M2		.6A * 250V						

* .3A S/B used for 220VAC operation.

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA: GRUNDIG PART No.	ASTATIC PART No. CARTRIDGE	ASTATIC PART No. NEEDLE	ELECTRO-VOICE PART No. CARTRIDGE	ELECTRO-VOICE PART No. NEEDLE	JENSEN PART No. CARTRIDGE	JENSEN PART No. NEEDLE	SONOTONE PART No. CARTRIDGE	SONOTONE PART No. NEEDLE
M3		13TB *	Not Req.	66 †	Not Req.			8TA4-S *	N-8TA-S

* Includes Mounting. † Use Mount PT-3.

PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA: GRUNDIG PART No.	CLEVITE WALCO PART No.	JENSEN PART No.	REMARKS
M4		W-104STS † or W-104STD ♦	CRA-57 † or CRA-57D ♦ and CRA-57X † or CRA-57XD ♦	† Jewel ♦ Diamond

MISCELLANEOUS

ITEM No.	PART NAME	GRUNDIG PART No.	NOTES
M5	Tuning Cap.	9653-407	4 Gang (AM Sections: Ant. 11.5-531.5mmf, Osc. 11.5-411.5mmf)
M6	RF Tuner		
M7	Switch		Function, Off, PU, BC, SW I, SW II, FM (Pushbutton Type)
M8	Switch		Voice-Music (Pushbutton Type)

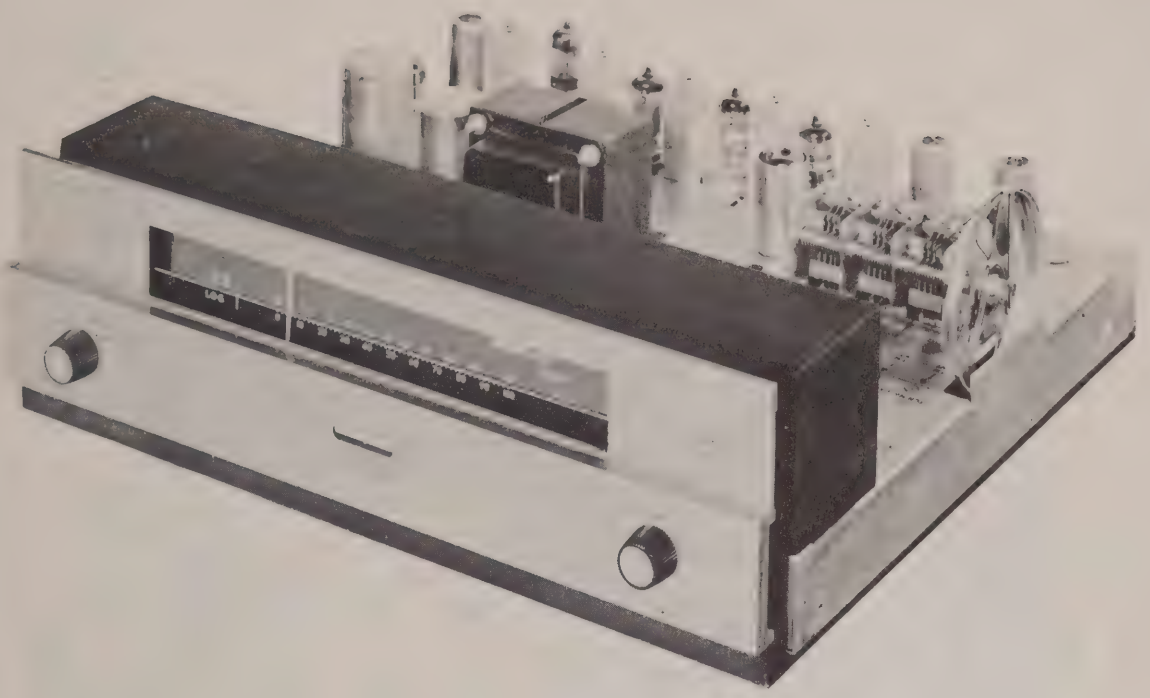
WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord	Use BELDEN No. 1765-B (6 Ft. Length) 1725-K (7½ Ft. Length)
Low-Loss Shielded Lead (Interconnecting)	Use BELDEN No. 8401
Phono Pick-up Arm Cable	Use BELDEN No. 8430 (Two Conductor - Twisted)

PHOTOFACT® Folder

HARMAN-KARDON
MODEL F-250

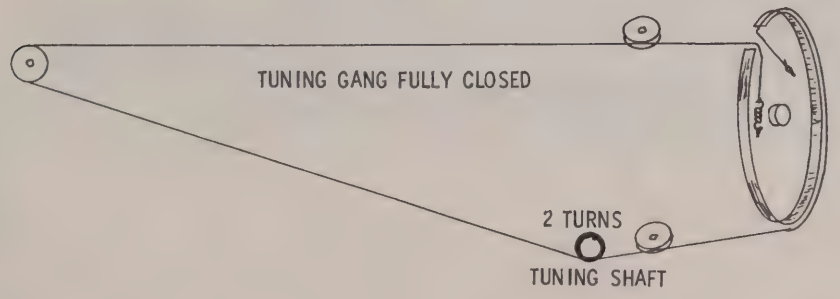
HARMAN-KARDON
MODEL F-250



HARMAN-KARDON
MODEL F-250

TRADE NAME	Harman-Kardon Model F-250 (The Lyric)
MANUFACTURER	Harman-Kardon, Inc., 520 Main Street, Westbury, L. I., N. Y.
TYPE SET	AC Operated 10 Tube FM Tuner
POWER SUPPLY	105-125 Volts AC, 60 Cycles
RATING	37 Watts, .4 Amp. @ 117 Volts AC
TUNING RANGE—	FREQ. MOD. 88 - 108MC

DIAL CORD STRINGING



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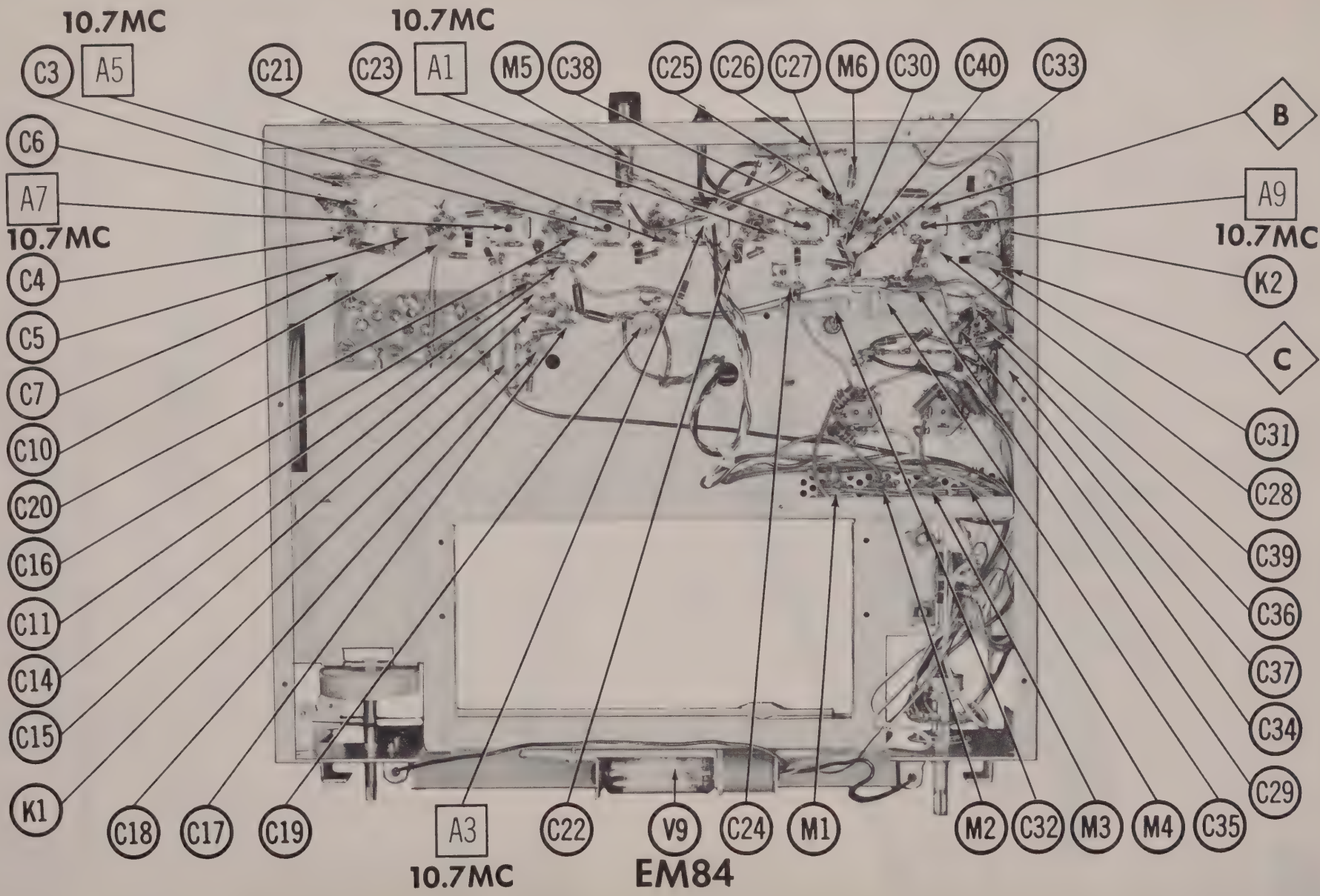
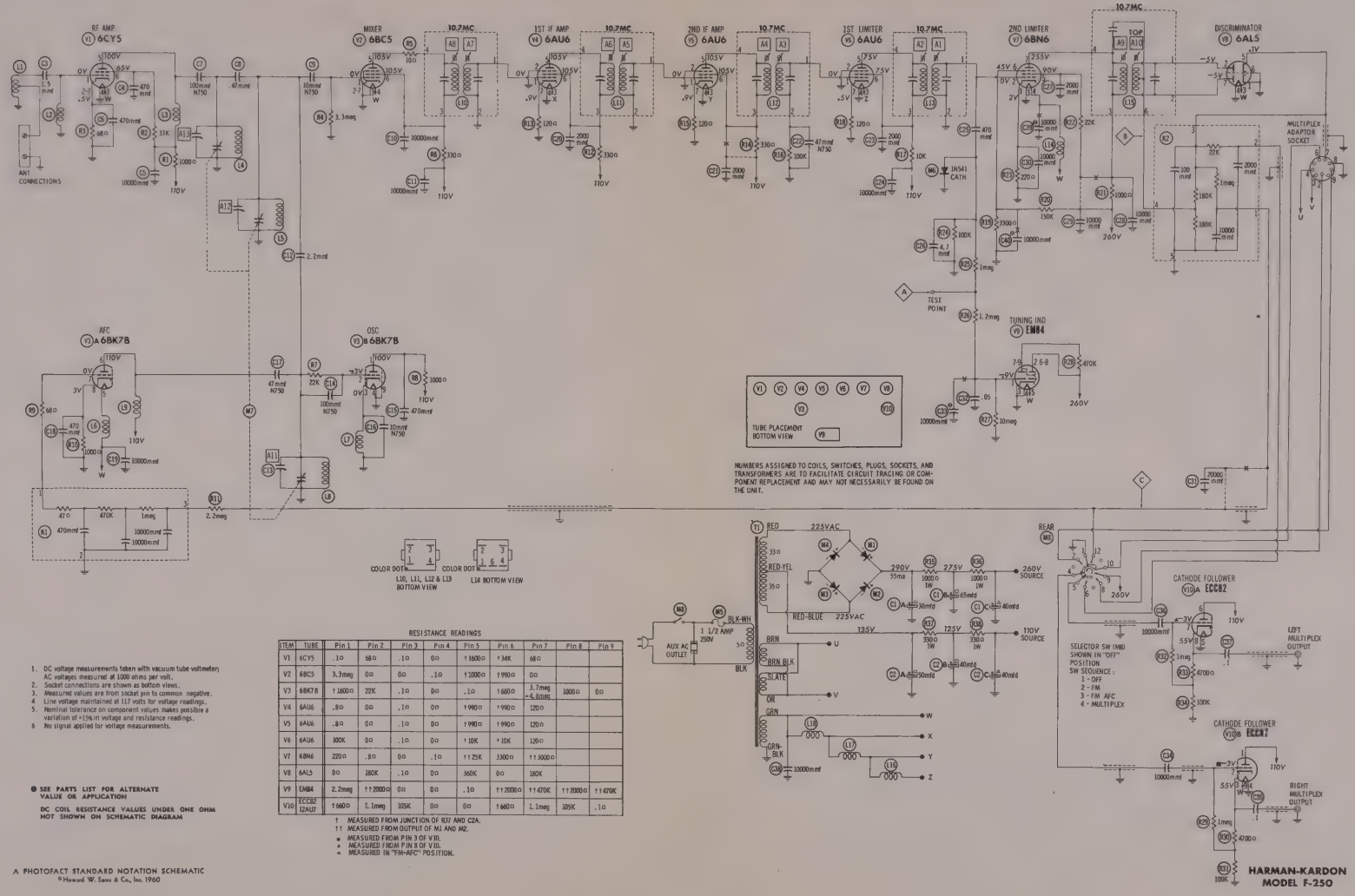


CHASSIS BOTTOM VIEW – ALIGNMENT, CAPACITOR & MISC. IDENT.



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6CY5	.1Ω	68Ω	.1Ω	0Ω	†1600Ω	†34K	68Ω		
V2	6BC5	3.3meg	0Ω	0Ω	.1Ω	†1000Ω	†990Ω	0Ω		
V3	6BK7B	†1600Ω	22K	.1Ω	0Ω	.1Ω	†660Ω	3.7meg +6.6meg	1000Ω	0Ω
V4	6AU6	.8Ω	0Ω	.1Ω	0Ω	†990Ω	†990Ω	120Ω		
V5	6AU6	.8Ω	0Ω	.1Ω	0Ω	†990Ω	†990Ω	120Ω		
V6	6AU6	100K	0Ω	.1Ω	0Ω	†10K	†10K	120Ω		
V7	6BN6	220Ω	.8Ω	0Ω	.1Ω	††25K	3300Ω	††3000Ω		
V8	6AL5	0Ω	180K	.1Ω	0Ω	360K	0Ω	180K		
V9	EM84	2.2meg	††2000Ω	0Ω	0Ω	.1Ω	††2000Ω	††470K	††2000Ω	††470K
V10	ECC82 12AU7	†660Ω	1.1meg	105K	0Ω	0Ω	†660Ω	1.1meg	105K	.1Ω

† MEASURED FROM JUNCTION OF R37 AND C2A.
†† MEASURED FROM OUTPUT OF M1 AND M2.
● MEASURED FROM PIN 3 OF V10.
▲ MEASURED FROM PIN 8 OF V10.
■ MEASURED IN "FM-AFC" POSITION.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. No signal applied for voltage measurements.

● SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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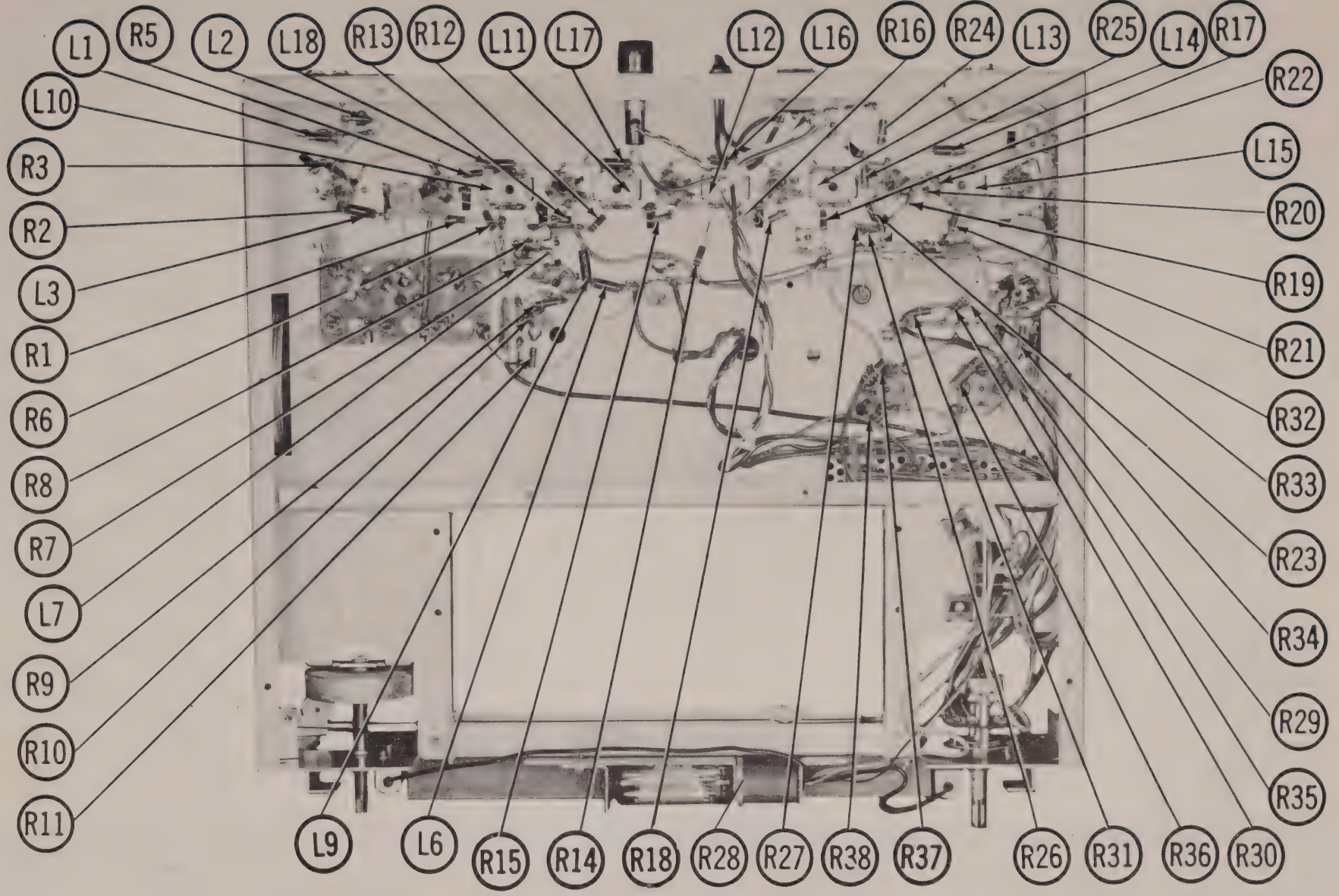


CHASSIS BOTTOM VIEW – RESISTOR & INDUCTOR IDENT.

ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS

Output of signal generator should be no higher than necessary to obtain an output reading.
Suggested Alignment Tools: A1 thru A10 ..... GENERAL CEMENT #5097, 8727
WALSCO #2515
All thru A13 ..... GENERAL CEMENT #5004, 5008, 5009
WALSCO #2520

IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1.	High side thru .001mfd to RF stator lug of tuning gang. Low side to chassis.	10.7MC (Unmod.)	Point of non-interference	DC probe thru 100K to point (A). Common to chassis.	A1, A2, A3, A4, A5, A6, A7, A8	Adjust for maximum deflection.
2.	"	"	"	DC probe thru 100K to point (B). Common to chassis.	A9	"
3.	"	"	"	DC probe to point (C). Common to chassis.	A10	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60~ modulation and 450KC sweep. Use 120~ sawtooth voltage in scope for horizontal deflection.

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
1.	High side thru .001mfd to RF stator lug of tuning gang.	10.7MC (450KC Swp)	Point of non-interference	Vert. Amp. thru 100K to point (A). Low side to chassis.	A1, A2, A3, A4, A5, A6, A7, A8	Adjust for maximum gain and symmetry of response similar to Fig. 1.
2.	"	"	"	Vert. Amp. thru 100K to point (B). Low side to chassis.	A9	"
3.	"	"	"	Vert. Amp. thru 100K to point (C). Low side to chassis.	A10	Adjust to place marker at the center of crossover lines similar to Fig. 2. SLIGHTLY retouch A9 for maximum amplitude and straightness of cross-over lines.

RF ALIGNMENT

Coils not containing adjustable cores are adjusted by expanding or compressing coil turns.

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
4.	Across FM antenna terminals.	106MC (Unmod.)	106MC	DC probe thru 100K to point (A). Common to chassis.	A11, A12, A13	Adjust for maximum deflection.
5.	"	90MC	90MC	"	L4, L5, L8	"

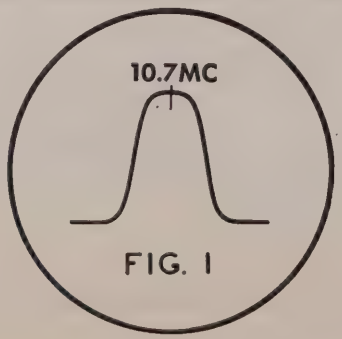


FIG. 1

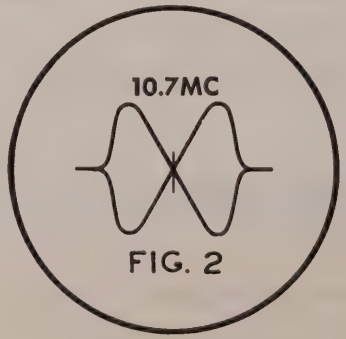


FIG. 2

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	RF Amplifier	6CY5	V6	1st Limiter	6AU6
V2	Mixer	6BC5	V7	2nd Limiter	6BN6
V3	Osc. - AFC	6BK7B	V8	Discriminator	6AL5
V4	1st IF Amplifier	6AU6	V9	Tuning Indicator	EM84
V5	2nd IF Amplifier	6AU6	V10	Cathode Follower	ECC82/12AU7

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA Harman-Kardon PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	▲30	300	JE2502987	AFH4-02-10	D0022	FP419.5	TMD-56 TD-30-300	TVL-4580	
B	■65	300							
C	▲40	300							
C2A	▲50	200	JE2502988	AFH4-02-10	D0022	FP419.5	TMD-31 TD-30-450	TVL-4580	
B	■40	200							
C	▲40	200							

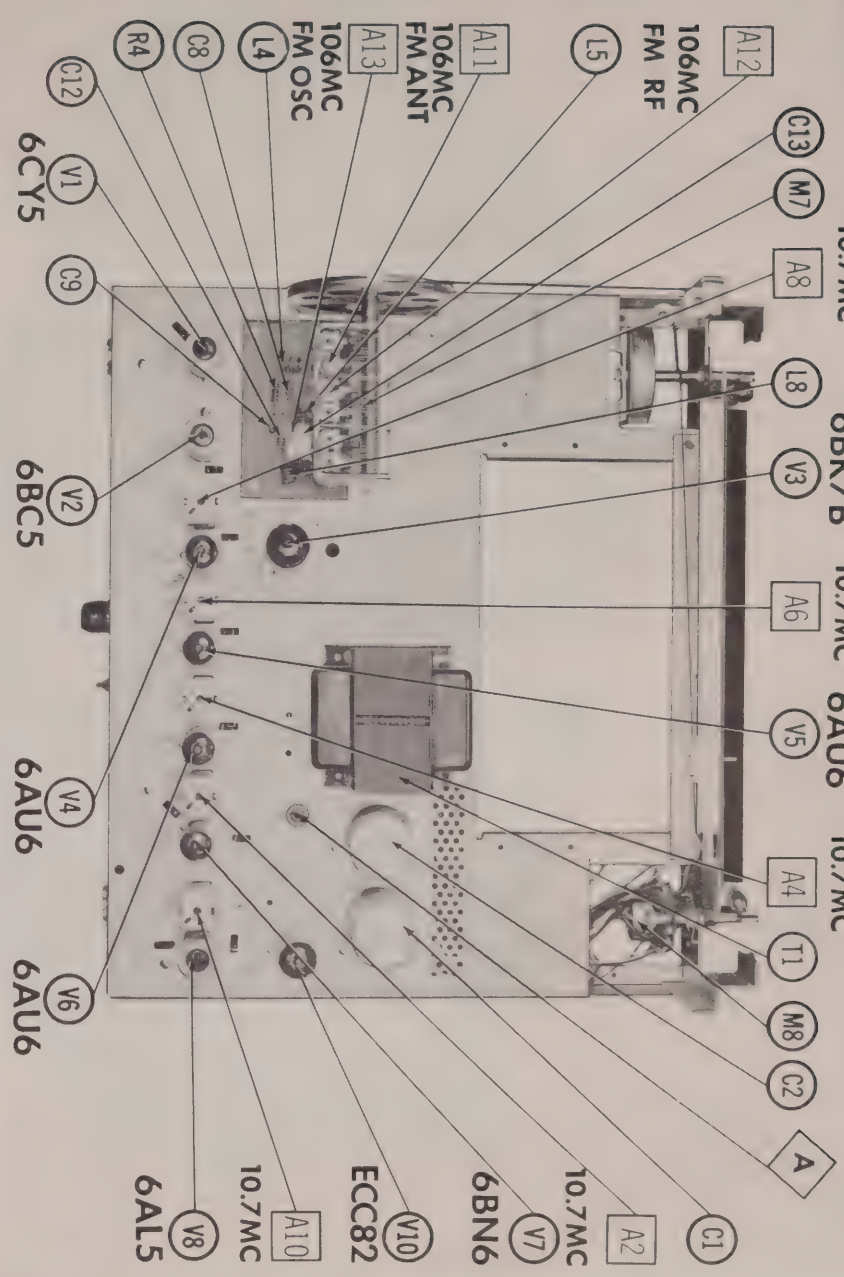
FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C3	1.5		NPO-SI 1.5	TCZ-1R5	C10V15C		CNO-515	10TCC-V15
C4	470		BPD-00047	DD-471	BYA10T47	CCD-471	B-347	5GA-T47
C5	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C6	470		BPD-00047	DD-471	BYA10T47	CCD-471	B-347	5GA-T47
C7	100 N750		N750-DI 100	DTN-100	C10T1U	CCTN-101	CN7-310	10TCU-T10
C8	.47			TCZ-R5				
C9	10 N750		N750-DI 10	DTN-10	C10Q1U	CCTN-100	CN7-410	10TCU-Q10
C10	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C11	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C12	2.2		NPO-SI 2.2	TCZ-2R2	C10V22C	CCTO-2R2	CNO-522	10TCC-V22
C13								
C14	100 N750		N750-DI 100	DTN-100	C10T1U	CCTN-101	CN7-310	10TCU-T10
C15	470		BPD-00047	DD-471	BYA10T47	CCD-471	B-347	5GA-T47
C16	10 N750		N750-DI 10	DTN-10	C10Q1U	CCTN-100	CN7-410	10TCU-Q10
C17	47 N750		N750-DI 47	DTN-47	C10Q47U	CCTN-470	CN7-447	10TCU-Q47
C18	470		BPD-00047	DD-471	BYA10T47	CCD-471	B-347	5GA-T47
C19	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C20	2000		BPD-002	DD-202	BYA10D2	CCD-202	B-220	5HK-D20
C21	2000		BPD-002	DD-202	BYA10D2	CCD-202	B-220	5HK-D20
C22	47 N750		N750-DI 47	DTN-47	C10Q47U	CCTU-470	CN7-447	10TCU-Q47
C23	2000		BPD-002	DD-202	BYA10D2	CCD-202	B-220	5HK-D20
C24	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C25	470		BPD-00047	DD-471	BYA10T47	CCD-471	B-347	5GA-T47
C26	4.7		NPO-DI 4.7	TCZ-4R7	C10V47C	CCTO-4R7	CNO-547	10TCC-V47
C27	2000		BPD-002	DD-202	BYA10D2	CCD-202	B-220	5HK-D20
C28	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C29	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C30	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C31	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C32	.05 200V		P288N-05	DD-503	CUB2S5	4DP-3-503	GEM-415	2TM-S5
C33	10000	Note 1	BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C34	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C35	.1 200V		P288N-1	DF-104	CUB2P1	2DP-3-104	GEM-201	2TM-P1
C36	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C37	.1 200V		P288N-1	DF-104	CUB2P1	2DP-3-104	GEM-201	2TM-P1
C38	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C39	10000	Note 1	BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C40	10000	Note 1	BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10

Note 1. Not used in some versions.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R1	1000Ω	
R2	33K	
R3	68Ω	
R4	3.3meg	
R5	10Ω	
R6	330Ω	
R7	22K	
R8	1000Ω	
R9	68Ω	
R10	1000Ω	
R11	2.2meg	
R12	330Ω	
R13	120Ω	

ITEM No.	RATING	REMARKS
R14	330Ω	
R15	120Ω	
R16	100K	
R17	10K	
R18	120Ω	
R19	3300Ω	
R20	150K	
R21	1000Ω	
R22	22K	
R23	220Ω	
R24	100K	
R25	1meg	
R26	1.2meg	

ITEM No.	RATING	REMARKS
R27	10meg	
R28	470K	
R29	1meg	
R30	4700Ω	
R31	100K	
R32	1meg	
R33	4700Ω	
R34	100K	
R35	1000Ω 1W	
R36	1000Ω 1W	
R37	330Ω 1W	
R38	330Ω 1W	

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	Harman-Kardon PART No.	REPLACEMENT DATA
K1	AFC Filter Network	470mmf, 10000mmf, 10000mmf, 47Ω, 470K, 1meg	PCCOM3080	
K2	Discriminator Network	100mmf, 2000mmf, 10000mmf, 22K, 180K, 180K, 1meg	PCCOM3081	

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		Harman-Kardon PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	Antenna Coil	GLCOM3082						2uh
L2	RF Choke	GLCOM3083						
L3	RF Choke							3.3uh
L4	RF Coil							
L5	Mixer Coil							
L6	Fil. Choke							3.3uh
L7	Cathode Choke		19-1000	19-1000	BC-561	4602		1uh
L8	Osc. Coil							
L9	RF Choke							3.3uh
L10	1st IF Trans.	GT2503045	16-3487	16-3487	FM-254	1463		
L11	2nd IF Trans.	GT2503045	16-3487	16-3487	FM-254	1463		
L12	3rd IF Trans.	GT2503045	16-3487	16-3487	FM-254	1463		
L13	4th IF Trans.	GT2503045	16-3487	16-3487	FM-254	1463		
L14	Fil. Choke							3.3uh
L15	Discriminator	GT2503052	17-3494	17-3494	FM-253	1464		
L16	Fil. Choke							3.3uh
L17	Fil. Choke							3.3uh
L18	Fil. Choke							3.3uh

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA						
	PRI.	SEC. 1	SEC. 2	Harman-Kardon PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V ② .40A	225VCT ② .050A	6.3V ② 3.1A	FTCOM2989						
	SEC. 3	SEC. 4	SEC. 5							
	6.3V Not used	6.3V Not used								

RECTIFIERS

ITEM No.	RATING	REPLACEMENT DATA					NOTES
	CURRENT (Measured)	Harman-Kardon PART No.	INTERNATIONAL PART No.	ITT PART No.	SARKES TARZIAN PART No.	SYLVANIA PART No.	
M1	.055A	Z1362133 ①	RS065 ①	1234AH ①	65 ①	SR200 ②	① Selenium Type
M2	.055A	Z1362133 ①	RS065 ①	1234AH ①	65 ①	SR200 ②	② Silicon Type
M3	.055A	Z1362133 ①	RS065 ①	1234AH ①	65 ①	SR200 ②	
M4	.055A	Z1362133 ①	RS065 ①	1234AH ①	65 ①	SR200 ②	

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			Harman-Kardon PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M5	3AG	1½A 250V	ECOM2953		31201.5 (3AG 1½A 250V)	342001	AGC 1½	HKP

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA				NOTES
		Harman-Kardon PART No.	CBS PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
M6	1N541		1N60	1N60	1N295	Tuning Indicator, Rectifier (Pigtail)

MISCELLANEOUS

ITEM No.	PART NAME	Harman-Kardon PART No.	NOTES
M7	Tuning Cap.	JV2513075	3 Gang
M8	Switch	ER2513079	Function (Off FM FM-AFC Multiplex)

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	PCOM2865	Function, Tuning
Dial Glass	P2513041	

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)

PHOTOFACT® Folder

HARMONY
MODEL SA-20

HARMONY
MODEL SA-20

HARMONY
MODEL SA-20

TRADE NAME	Harmony Model SA-20
MANUFACTURER	Continental Mfg., Inc., 1612 California Street, Omaha, Nebraska
TYPE SET	AC Operated 8 Tube Stereo Amplifier
POWER SUPPLY	110-120 Volts AC, 50-60 Cycles RATING 72 Watts, .81 Amp. @ 117 Volts AC

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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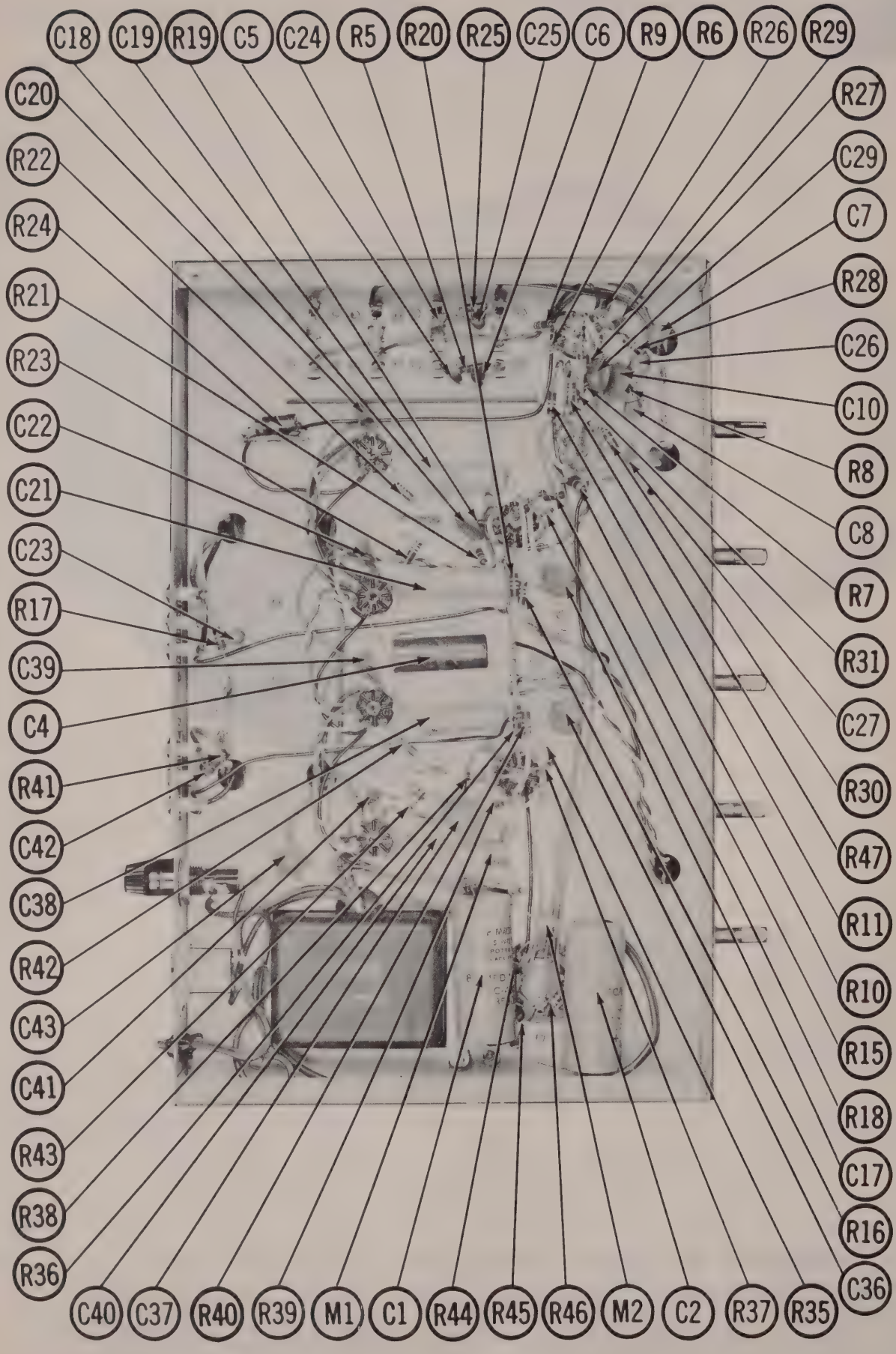


CHASSIS BOTTOM VIEW

PARTS LIST AND DESCRIPTIONS

TUBES

• CBS • GENERAL ELECTRIC • RAYTHEON • SYLVANIA •

ITEM No.	USE	TYPE
V1	Channel 1 Phono Preamp. - Channel 2 Phono Preamp.	ECC83/12AX7
V2	Channel 1 AF Amp. - Channel 2 AF Amplifier	ECC83/12AX7
V3	Channel 1 AF Amp. - Channel 1 Phase Inverter	ECC83/12AX7
V4	Channel 1 Output	6AQ5A
V5	Channel 1 Output	6AQ5A
V6	Channel 2 AF Amp. - Channel 2 Phase Inverter	ECC83/12AX7
V7	Channel 2 Output	6AQ5A
V8	Channel 2 Output	6AQ5A

ELECTROLYTIC CAPACITORS

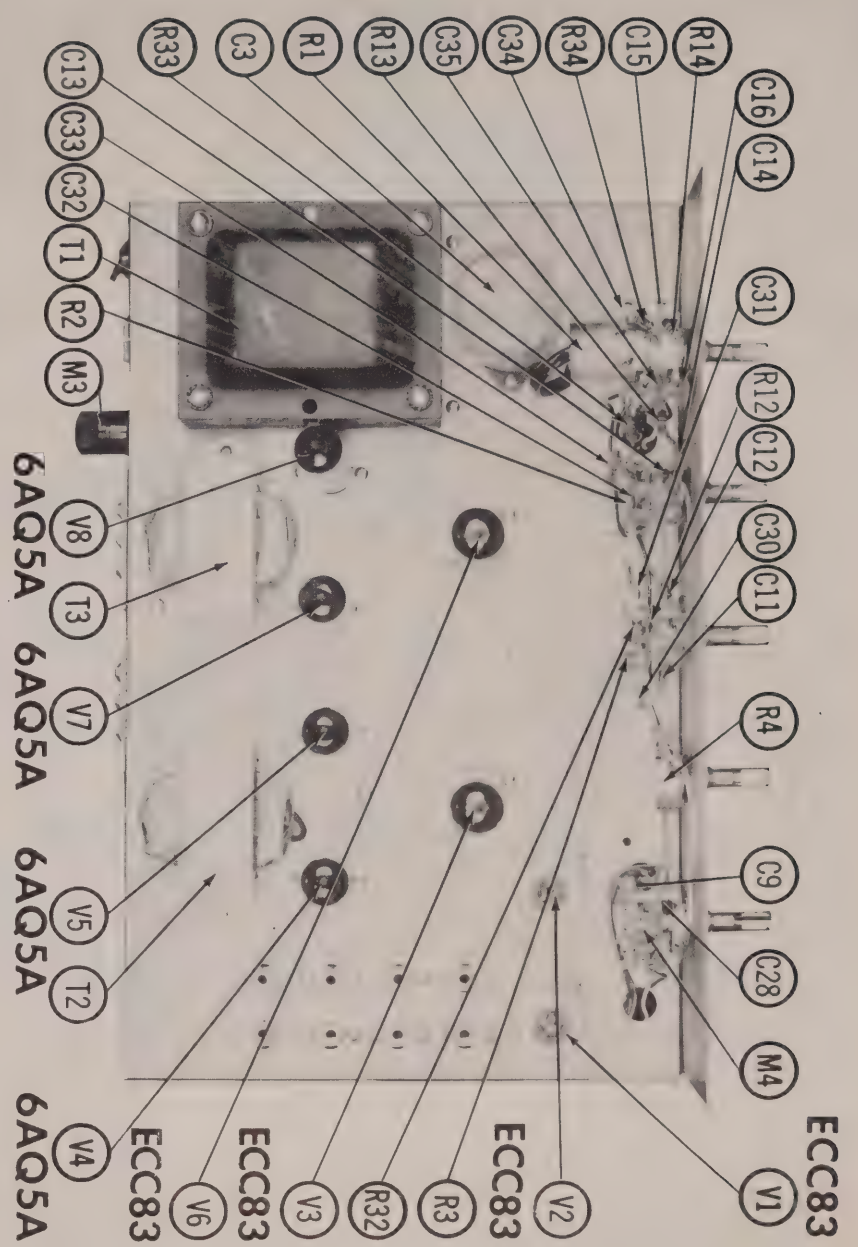
ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA HARMONY PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1	80	150		PRS1500	BR8015	TC492	TD-80-150	TVA-1418	
C2	80	150		PRS1500	BR8015	TC492	TD-80-150	TVA-1418	
C3A	▲40	350		AFH4-06-40	D0054	FP421. 9	TMQ-119	TVL-4674	
B	■40	350							
C	▲30	350							
D	20	350							
C4	50	25		PRS1265	BBR50-25	TC29	TD-50-25	TVA-1206	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C5	470		BPD-00047	DD-471	BYA10T47	CCD-471	B-347	5GA-T47
C6	27		DI-27	DD-270	L10Q27	CCD-270	GP427	5GA-Q27
C7	1500		BPD-0015	DD-152	BYA10D15	CCD-152	B-215	5HK-D15
C8	3300		BPD-0033	DD-332	BYA10D33	CCD-332	B-233	5HK-D33
C9	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C10	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C11	470		BPD-00047	DD-471	BYA10T47	CCD-471	B-347	5GA-T47
C12	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C13	2000		BPD-002	DD-202	BYA10D2	CCD-202	B-220	5HK-D20
C14	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C15	47		DI-47	DD-470	L10Q47	GP447	CCD-470	5GA-Q47
C16	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C17	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C18	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C19	.047 400V		P488N-047	DD-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C20	470		BPD-00047	DD-471	BYA10T47	CCD-471	B-347	5GA-T47
C21	.047 400V		P488N-047	DD-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C22	470		BPD-00047	DD-471	BYA10T47	CCD-471	B-347	5GA-T47
C23	100		BPD-0001	DD-101	L10T1	CCD-101	GP310	5GA-T10
C24	470		BPD-00047	DD-471	BYA10T47	CCD-471	B-347	5GA-T47
C25	27		DI-27	DD-270	L10Q27	CCD-270	GP427	5GA-Q27
C26	1500		BPD-0015	DD-152	BYA10D15	CCD-152	B-215	5HK-D15
C27	3300		BPD-0033	DD-332	BYA10D33	CCD-332	B-233	5HK-D33
C28	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C29	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C30	470		BPD-00047	DD-471	BYA10T47	CCD-471	B-347	5GA-T47
C31	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C32	2000		BPD-002	DD-202	BYA10D2	CCD-202	B-220	5HK-D20
C33	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C34	47		DI-47	DD-470	L10Q47	CCD-470	GP447	5GA-Q47
C35	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C36	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C37	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C38	.047 400V		P488N-047	DD-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C39	470		BPD-00047	DD-471	BYA10T47	CCD-471	B-347	5GA-T47
C40	.047 400V		P488N-047	DD-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C41	470		BPD-00047	DD-471	BYA10T47	CCD-471	B-347	5GA-T47
C42	100		BPD-0001	DD-101	L10T1	CCD-101	GP310	5GA-T10
C43	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	HARMONY PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	500K 125K tap	½	BA820-023	BT-66				Loudness, Channel 1
B	500K 125K tap	½		STR-66			† UE4064S	Loudness, Channel 2
C	Switch			KR-1				
D	Sw. Cover			KR-5				
R2A	500K	½	BA817-187	B-59	AD47-500K-S	Q11-133		Bass, Channel 1
B	500K	½		SR-59	Not Req.	M11-133	■ UE1295	Bass, Channel 2
C	Shaft			Not Req.	KSS-3	Not Req.		
R3A	500K	½	BA817-187	B-59	AD47-500K-S	Q11-133		Treble, Channel 1
B	500K	½		SR-59	Not Req.	M11-133	■ UE1295	Treble, Channel 2
C	Shaft			Not Req.	KSS-3	Not Req.		
R4A	500K	½	BA811-2804	B-59	A47-500K-S	Q11-133	U50	Balance
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	

† "STA-LOC" Equivalent: FA55T1253, RU55T1253, CS3500.
■ "STA-LOC" Equivalent: FA55L, RU55L, CS3500.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	ITEM No.	RATING	ITEM No.	RATING	ITEM No.	RATING	ITEM No.	RATING	ITEM No.	RATING
R5	1.5meg	R13	22K	R21	3.3meg	R29	470Ω	R37	100Ω	R45	4700Ω 1W
R6	47K	R14	47K	R22	470K	R30	3.3meg	R38	100K	R46	22K
R7	100K	R15	3.3meg	R23	470K	R31	100K	R39	3.3meg	R47	22K
R8	100K	R16	270K	R24	47Ω 2W	R32	100K	R40	270K		
R9	470Ω	R17	10K	R25	1.5meg	R33	22K	R41	10K		
R10	3.3meg	R18	100Ω	R26	47K	R34	47K	R42	470K		
R11	100K	R19	100K	R27	100K	R35	3.3meg	R43	470K		
R12	100K	R20	270K	R28	100K	R36	270K	R44	1500Ω 2W		

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA						
	PRI.	SEC. 1	SEC. 2	HARMONY PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V ⓐ .81A	120V ⓐ .580A (AC)	6.3VCT ⓐ 2.7A	14-K-4						

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	HARMONY PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	7800Ω CT	16Ω Tap ⓐ 8Ω	14W5	22S58	A-3027	AU-606	A-3870	22S58	S-55X	
T3	7800Ω CT	16Ω Tap ⓐ 8Ω	14W5	22S58	A-3027	AU-606	A-3870	22S58	S-55X	

RECTIFIERS

ITEM No.	RATING	REPLACEMENT DATA					NOTES
	CURRENT (Measured)	HARMONY PART No.	INTERNATIONAL PART No.	ITT PART No.	SARKES TARZIAN PART No.	SYLVANIA PART No.	
M1	.105A	①	5E4 ①	HA154 ①	40K ①	SR200 ①	① Selenium Type
M2	.105A	①	5E4 ①	HA154 ①	40K ①	SR200 ①	

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			HARMONY PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M3	3AG	3A 250V			312003 (3AG 3A 250V)	342001	AGC 3	HKP

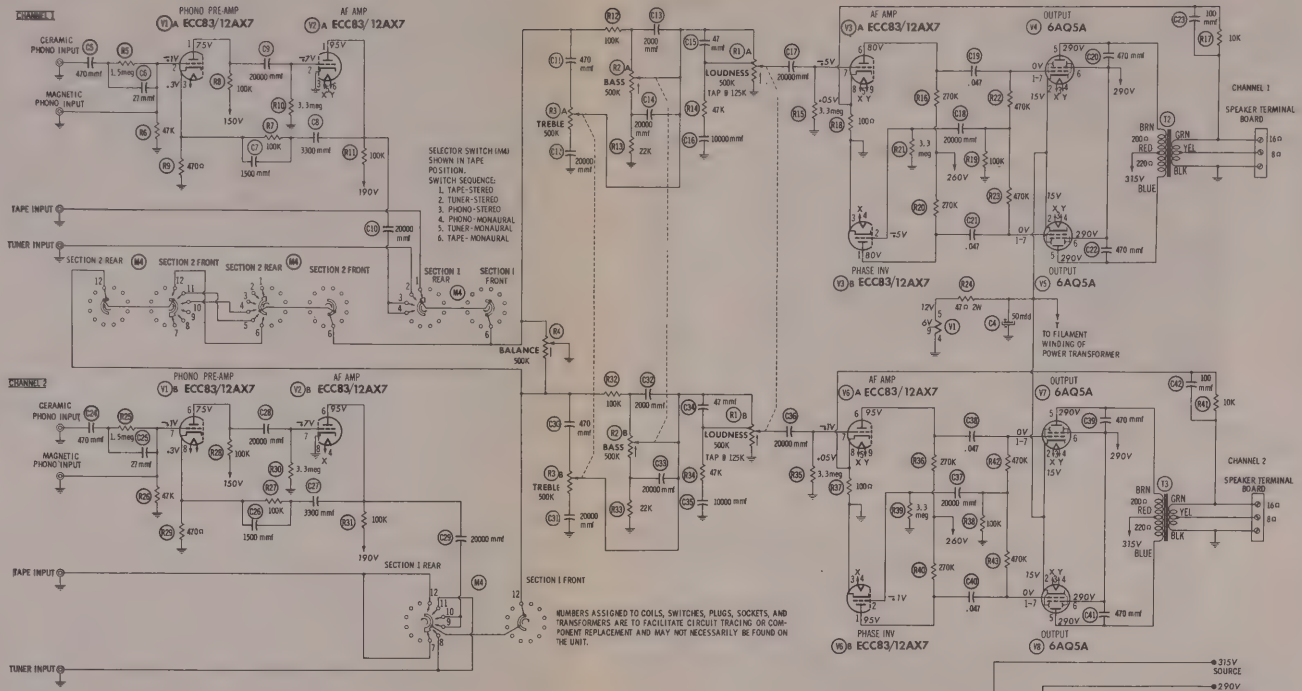
MISCELLANEOUS

ITEM No.	PART NAME	HARMONY PART No.	NOTES
M4	Switch		Selector

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	ECC83 12AX7	↑150K	47K	470Ω	0Ω	12Ω	↑150K	47K	470Ω	6Ω
V2	ECC83 12AX7	↑130K	3.3meg	0Ω	59Ω	59Ω	↑130K	3.3meg	0Ω	59Ω
V3	ECC83 12AX7	↑275K	3.3meg	0Ω	59Ω	59Ω	↑275K	3.3meg	100Ω	59Ω
V4	6AQ5A	570K	59Ω	59Ω	59Ω	↑200Ω	↑1500Ω	570K		
V5	6AQ5A	570K	59Ω	59Ω	59Ω	↑200Ω	↑1500Ω	570K		
V6	ECC83 12AX7	↑275K	3.3meg	0Ω	59Ω	59Ω	↑275K	3.3meg	100Ω	
V7	6AQ5A	570K	59Ω	59Ω	59Ω	↑200Ω	↑1500Ω	570K		
V8	6AQ5A	570K	59Ω	59Ω	59Ω	↑220Ω	↑1500Ω	570K		

↑ MEASURED FROM OUTPUT OF M1.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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HARMONY MODEL SA-20

PHOTOFACT® Folder

MIRAPHON
MODEL XMS210

MIRAPHON
MODEL XMS210

MIRAPHON
MODEL XMS210

GENERAL INFORMATION

The Miraphon XMS 210 is a four-speed manual player for either stereophonic or monaural reproduction. The four-speed drive is arranged for 16 2/3, 33 1/3, 45, and 78 rpm.

The tone arm is suspended in ball bearings; thus, any displacement of the stylus is eliminated, and equal pressure is applied to the stylus. The plug-in head of the tone arm is so dimensioned that any commercial cartridge will fit it.

The record player must be connected to a 110-120 volt AC supply. All units leaving the factory are set for 110 volts. To operate the record changer at 220 volts, the voltage selector underneath the turntable can be set for 220 volts.

Supplied by:
Audiogersh Corporation
514 Broadway
New York 12, N. Y.

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SET 470 FOLDER 15

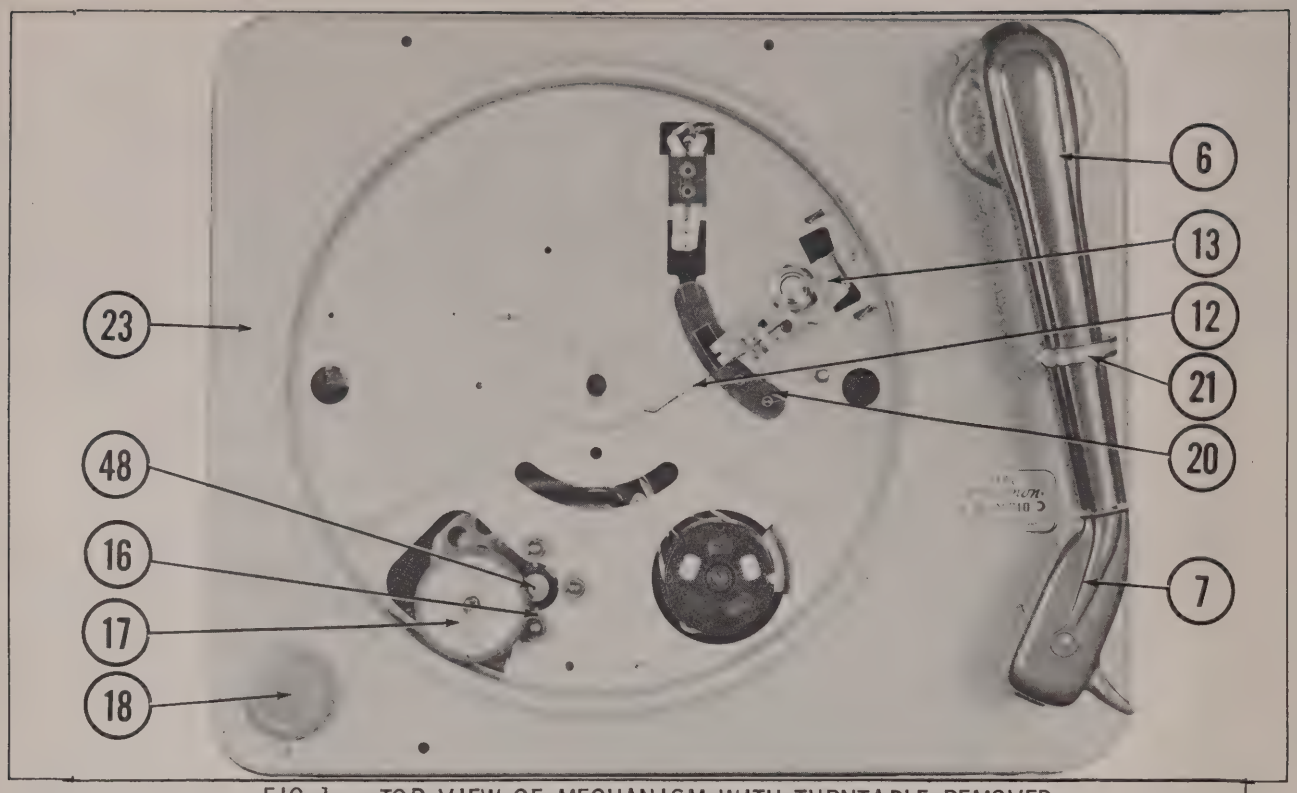

FIG. 1 TOP VIEW OF MECHANISM WITH TURNTABLE REMOVED.

SPECIFICATIONS

Power Requirements:

110-120 volts, 60 cycles AC. If specified, 50 cycles can also be furnished.

Chassis Dimensions:

Width, 16 1/32"; depth, 12 5/8".

Clearance Above Mounting Base:

4 3/4"

Clearance Below Top of Mounting Base:

2 7/8"

Plug-in Head:

Interchangeable plug-in head TAK1A for turnover systems and other systems.

PREPARING FOR OPERATION

Connecting to Preamplifier or Equalizer

The unit is connected to a preamplifier or equalizer by means of two pickup leads. A phone plug is attached to the end of the leads. The capacitance of the pickup leads should not exceed 200 mmf. For monaural reproduction, one pickup lead is short-circuited by means of a plug delivered with the unit, and the second lead is connected in the usual manner to the amplifier input.

For stereo reproduction, a stereophonic cartridge is required. Both pickup leads are connected to the marked input sockets of the proper two-channel amplifier.

OPERATING INSTRUCTIONS

NOTE: Always be careful when setting the speed control knob and stylus selector. Otherwise, both the record and the stylus could be damaged.

Speed Control Knob

For correct speed, turn speed control knob as follows:

1. To 78 rpm for standard 10" or 12" records.
2. To 45 rpm for 7" microgroove records.
3. To 33 1/3 rpm for 10" or 12" microgroove (LP) records.
4. To 16 2/3 rpm for 7" microgroove records.

IMPORTANT: When the record player is not in use, always place the speed control knob at position

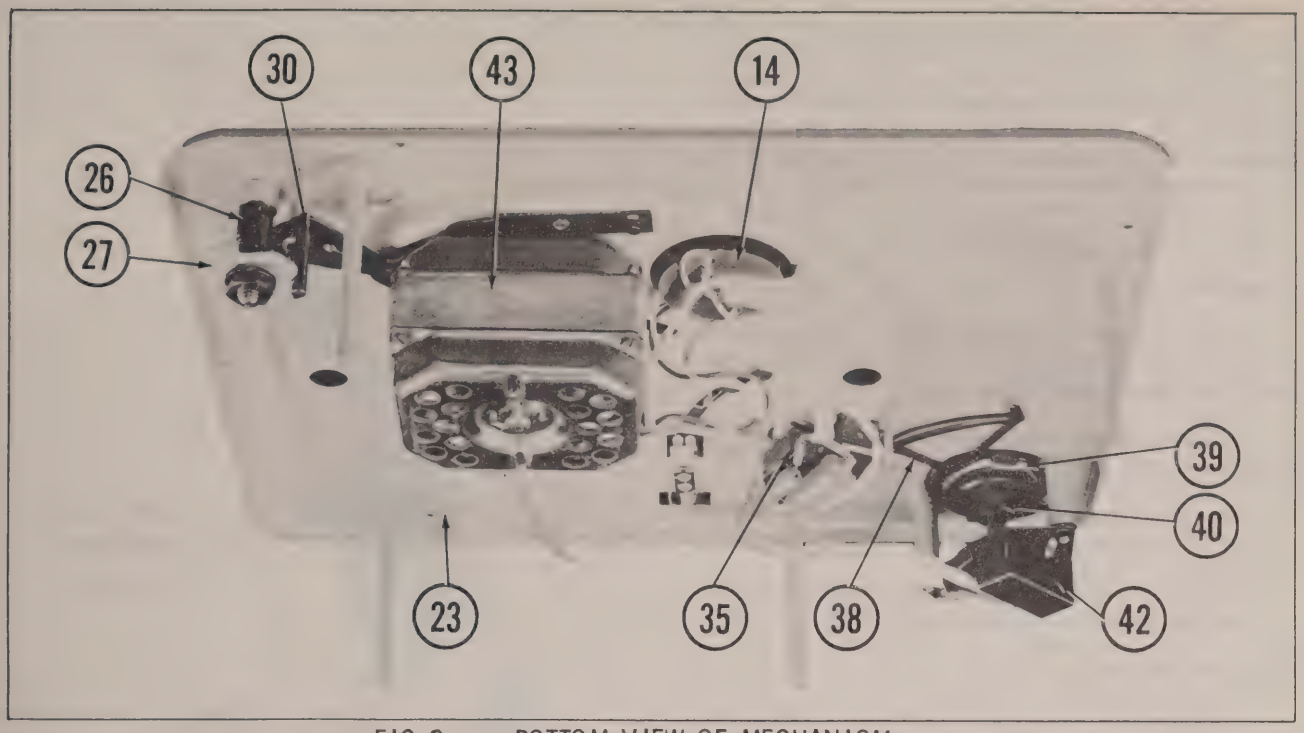

FIG.2 BOTTOM VIEW OF MECHANISM.

"O". This position eliminates the possibility of a flat spot developing on the rubber tire of idler wheel (17).

Setting The Stylus

The plug-in head fits all cartridges with standard mountings. A knock-out is provided at the front of the head for the shaft of the turnover cartridge. When magnetic cartridge Elac MST 2 is used, the small radius of the knob must point downward when microgroove records are being played. For standard-groove records, the long radius points downward. When magnetic cartridge Elac Stereotwin 200 is used, all microgroove records can be played monaurally and binaurally.

The plug-in head has another knock-out on top for the General Electric cartridge. The push-on knob for this cartridge must be set with the round side to the front for standard-groove records and with the pointed end to the front for microgroove records.

Switching On

After placing a record on the turntable, move the tone arm to its extreme right. Wait until the turntable has made about one-half revolution; then carefully place the tone arm on the lead-in grooves. When playing 7" records with a large center hole, use the 45-rpm adaptor.

Switching Off

After the record is completed, the player is automatically switched off. At the same time, the muting switch is closed to cut off any noise from the tone arm. The player can also be switched off manually by moving the tone arm slowly toward the center of the turntable. When the record player is not being used, place the tone arm on its rest and set the speed selector knob to the "O" position.

OPERATION

The player is driven by an asynchronous AC motor (43), which has a 4-step pulley mounted on its shaft. When the speed control knob is turned, idler wheel (17) is adjusted to ride on the different steps of the drive pulley by idler pivot lever (30) and speed change worm (26).

Starting, Muting, and Stopping

When the tone arm is moved to the extreme right, segment (38) swings clockwise and contacts the stud on the rear of switch lever (13). This action pivots switch lever (13) counterclockwise and actuates muting switch cam (20) which, in turn, closes muting switch (19), and the pickup cartridge becomes "live".

Simultaneously, switch lever (13) actuates the toggle on motor on-off switch (35), and the motor is energized.

This record player has a velocity-type shutoff mechanism which functions as follows:

As the stylus tracks across a record, segment (38) is moved inward by the weighted friction clutch on the arm shaft until segment (38) contacts the stud on the rear of switch lever (13). This action moves switch lever (13) and tracer spring (12) slowly toward the turntable hub. During each revolution of the turntable, the felt-covered stud underneath the turntable contacts the front edge of tracer spring (12) and moves it backward slightly.

When the stylus enters the lead-out groove at the end of the record, tone arm (6) and tracer spring (12) accelerate rapidly toward the turntable hub. This action permits the felt-covered stud underneath the turntable to move behind tracer spring (12) and to pivot switch lever (13) in such a manner that muting switch (19) and motor on-off switch (35) are opened.

ADJUSTMENTS

Stylus Pressure

The stylus pressure depends upon cartridge used. However, the stylus pressure for this mechanism should be approximately 6 grams.

The stylus pressure can be adjusted by turning the knurled nut (see Fig. 3) in the tone arm.

1. When the knurled nut is turned toward direction A, the stylus pressure is decreased.

2. When the knurled nut is turned toward direction B, the stylus pressure is increased.

Tone Arm Height

The tone arm height is adjusted by the tone arm height adjustment screw (see Fig. 3). The tone arm should be adjusted to land low enough that the stylus follows the grooves of a thin record. To adjust the tone arm height, loosen the locking nut and move the adjustment screw in or out until the correct adjustment is obtained. After the adjustment is completed, tighten the locking nut.

Idler Wheel Height

Place the speed control knob in one of the "O" positions and remove the turntable. Check to see that idler wheel (17) is horizontal and that its height is correct. The bottom edge of the idler wheel tire must not slide on the next step of the motor pulley. The height can be adjusted by loosening hex nut (29) and turning speed change worm (26). After the adjustment is completed, tighten hex nut (29). If necessary, set the speed control knob so that its numerals face the brown spot on the baseplate.

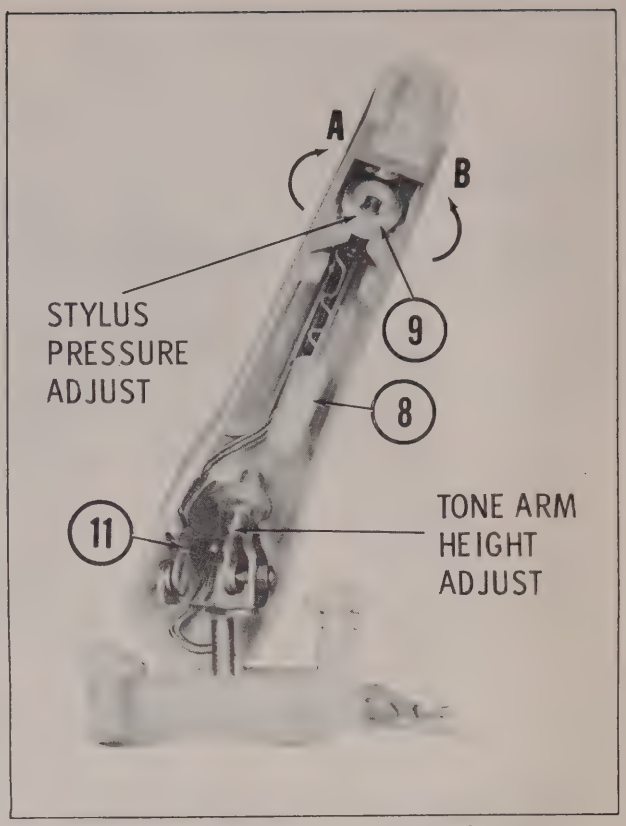

FIG.3 UNDERSIDE OF TONE ARM.

Automatic Shutoff

If the record player fails to shut off or if it shuts off before the stylus enters the lead-out groove of the record, adjust by repositioning tray (40), as follows:

With tone arm (6) clamped to its rest post, set screw (40A) should be positioned to face directly toward the front of the baseplate.

IMPORTANT: When tray (40) is repositioned, a small gap must be left between weight (37) and the baseplate to allow tone arm (6) to move freely across a record.

LUBRICATION

The motor bearings have been filled with enough oil (Shell Vitrea 27 or its equivalent) to last for many years. The turntable is lubricated with a very light grease (Esso Millcot K-40 or its equivalent).

Do not apply grease or oil to the inside of the turntable rim, the step pulley of the motor, or the rubber tire of the idler wheel. If oil or grease should accidentally fall on these parts, clean them with alcohol or acetone.

TROUBLE CHART

Symptom	Cause	Remedy
Turntable does not revolve when tone arm is placed in On position.	1. No current at motor.	1. (a). Check to see that current is reaching AC leads of player. (b). Check switch for proper operation.
	2. Defective motor.	2. Remove turntable to allow motor to operate without load. If current is reaching the motor, but the pulley does not rotate, the motor

Symptom	Cause	Remedy
		is defective; and should be replaced.
	3. Motor idler wheel does not engage turntable rim.	3. If the drive pulley is turning but the turntable is not: (a). Check motor idler assembly to determine whether it is free to contact the drive pulley and turntable rim. (b). Wipe inside rim of turntable to remove any dirt. Any oil should be removed from the turntable rim and rubber tire of the idler wheel with alcohol.
Turntable speed too slow.	1. Bind in turntable bearing.	1. Check the turntable bearing. Place speed control knob in "O" position and spin the turntable by hand. The turntable should turn readily and coast for a long time. If binding occurs, remove the turntable. Wipe any foreign matter from the turntable and lubricate with a light oil.
	2. Line voltage too low.	2. If the line voltage is less than 105 volts, the turntable speed may be too slow.
Recorded sound is distorted.	1. Defective record. 2. Defective amplifier.	1. Replace record. 2. Check phonograph amplifier and speaker.
	3. Defective cartridge.	3. Replace cartridge.
Stylus does not track across record properly.	1. Needle may be clogged by lint, dirt, etc.; or it may be worn.	1. (a). Clean foreign matter from around the stylus. (b). Check stylus to see whether the tip is bent or broken. If it is, replace.
	2. Check pickup bearing for binding.	2. If binding occurs, remove tone arm (6), clean off foreign matter, and lubricate tone arm (6) with a light oil.
	3. Player not level.	3. Level the player.
	4. Stylus pressure less than the recommended 6 grams.	4. Adjust as described in "Stylus Pressure" under "Adjustments."
	5. Tone arm (6) height incorrect.	Adjust as described in "Tone Arm Height" under "Adjustments."
Record player fails to shut off.	1. Automatic shutoff not functioning properly.	1. Check automatic shutoff adjustment as described in "Automatic Shutoff" under "Adjustments."
Rumble.	1. Idler wheel (17) defective.	1. Check for dent or depression on idler wheel (17). First run the player for several minutes at 78 rpm. If the dent does not disapear, replace idler wheel (17).

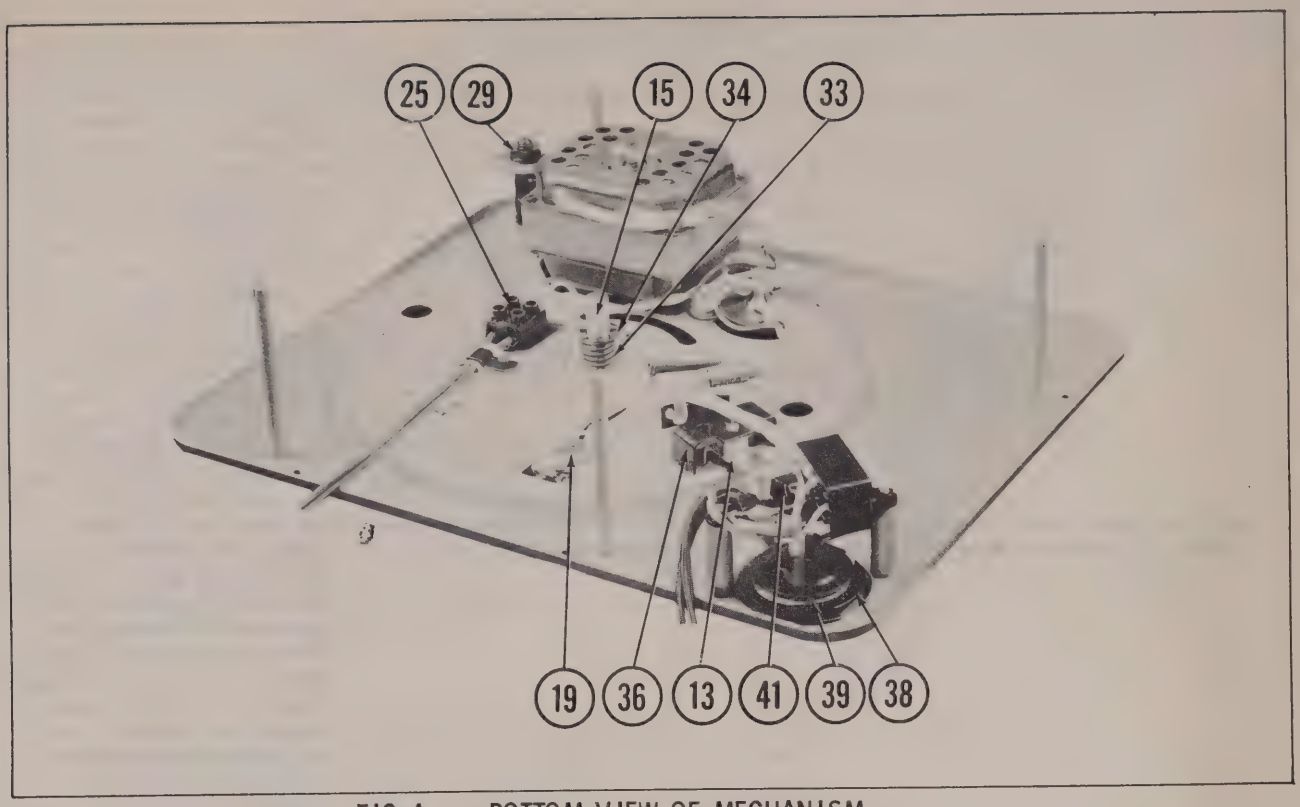

FIG.4 BOTTOM VIEW OF MECHANISM.

MECHANICAL PARTS LIST

Ref. No.	Part No.	Description
1	10-056	Adaptor 45 RPM
2	10-042-76	Rubber Mat, Brown
3	10-031-61	Cup, Transport Lock
4	10-031-63	Washer, Transport Lock
5	10-042U39	Turntable Complete
6	10-102B	Pick-up Arm
7	10-101T	Plug-in Head TAK1A
8	10-038-26	Tension Spring
9	10-038-29	Needle Pressure Adj. Nut
10	10-038-28	Headless Screw
11	10-042U2	Axle, Riveted
12	10-031-17	Tracer Spring
13	10-031U6	Switch Lever, Riveted
14	90-182A	Voltage Selector
15	10-031U2	Bushing
16	10-038-51	Rubber Grommet, Motor Mtg.
17	10-016U8	Idler Wheel Complete
18	10-027-21	Control Knob
19	10-031-22	Contact Spring
20	10-031U10	Cam
21	10-044U6	Tone Arm Bracket
22	10-031-51	Plastic Plug
23	10-042U38	Chassis, Complete
24	10-027-183	Insulating Plate
25	ERK777	Bakelite Connector

Ref. No.	Part No.	Description
26	10-027-341	Worm
27	10-027-22	Speed Change Cam
28	8-4D1N125	Washer
29	BM8D1N439	Hex Nut
30	10-038U3	Idler Pivot Lever, Riveted
31	10-016-36	Tension Spring
32	10-054-2	Support
33	10-031-41	Compression Spring
34	9-D1N6799	"C" Washer
35	10-016-25	Switch
36	10-031-B	Bracket
37	10-031-14	Weight
38	10-031-10	Segment
39	10-031-11	Felt Washer
40	10-031U18	Tray, Riveted
41	10-031U14	Plate, Complete
42	10-031U5	Shielding Cup, Complete
43	10-036N	Motor MOW8
44	10-031-43	Tray
45	10-031-50	Truncated Cone Spring
46	10-031-42	Cup
47	10-026-2	Clamp
48	10-036-30	Motor Pulley, 60 Cycles
	10-036-29	Motor Pulley, 50 Cycles

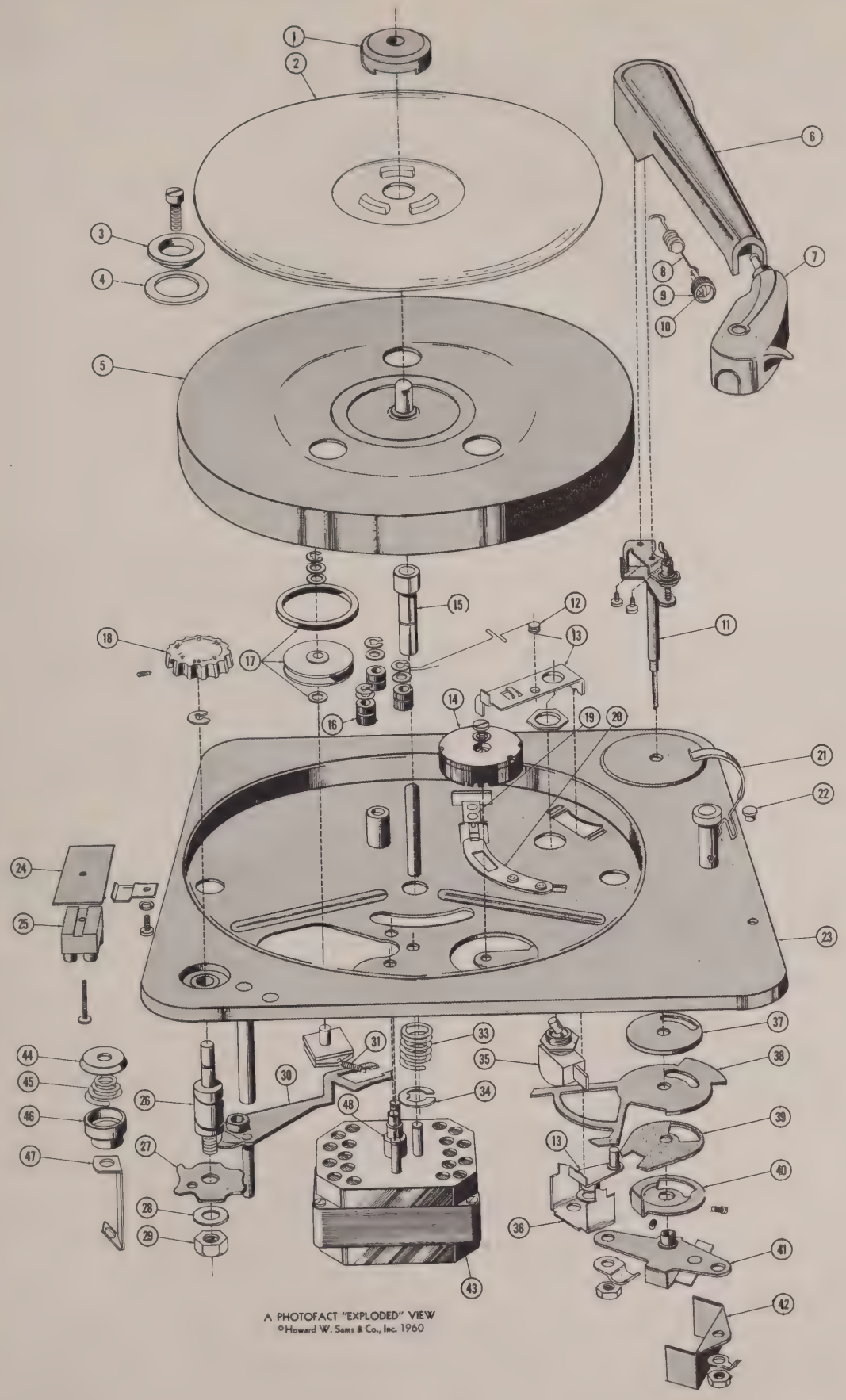

FIG.5 EXPLODED VIEW OF MECHANISM.

PHOTOFACT® Folder

MOTOROLA MODEL L14E (Ch. HS-730)

MOTOROLA MODEL
L14E (Ch. HS-730)

TRADE NAME	Motorola Model L14E (Ch. HS-730)
MANUFACTURER	Motorola Inc., 4545 W. Augusta Blvd., Chicago 51, Illinois
TYPE SET	Battery Operated Portable Transistorized AM Receiver
POWER SUPPLY	9 Volts DC
TUNING RANGE—BROADCAST	535 - 1620KC
RATING	11MA @ 9 Volts DC (No Signal, Min. Volume)
	13MA @ 9 Volts DC (Signal, Normal Volume)

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested Alignment Tools:
A1, A2, A3 ..... GENERAL CEMENT #5009, 8195, 8274, 8275, 8728, 8987
WALSCO #2531
A5, A5, A6 ..... GENERAL CEMENT #5004, 5008, 5009
WALSCO #2520
A7, A8 ..... GENERAL CEMENT #8282, 8606, 8606L, 9295
WALSCO #2526, 2543, 2544, 2545

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.		Loop	455KC (400~ Mod.)	Tuning gang fully open	Across voice coil	A1, A2, A3	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
2.		"	1620KC	"	"	A4	"
3.		"	1400KC	Tune to 1400KC signal	"	A5, A6	"
4.		"	600KC	Tune to 600KC signal	"	A7, A8	Adjust for maximum output while rocking tuning gang. Repeat steps 2, 3 and 4 until no further improvement can be obtained. Step 3 should be final step.

DISASSEMBLY INSTRUCTIONS

1. Loosen two back panel mounting screws five or six turns. Remove panel. (If necessary, press in on bottom center edge to swing panel free.)
2. Remove two cabinet back mounting screws from under batteries. Remove back.
3. Remove volume, tuning and pointer knobs.
4. Remove two dial scale mounting screws. Remove dial.
5. Remove two chassis mounting screws from under dial scale.
6. Remove nut holding volume control.
7. Remove nut holding earphone jack.
8. Unsolder chassis leads. Remove chassis.

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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JF463

SET 470 FOLDER 16

PARTS LIST AND DESCRIPTIONS

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA				NOTES
			CBS PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	2N1107	RF Amplifier			2N487	2N409	PNP
X2	2N1109	Oscillator			2N485	2N412	PNP
X3	2N1108①	Mixer			2N486	2N412	PNP
X4	2N1110	1st IF Amplifier			2N483	2N409	PNP
X5	2N1111 ②	2nd IF Amplifier			2N483	2N409	PNP
X6	2N238	Driver		2N407		2N407	PNP
X7	2N185	Output		2N407		2N407	PNP } Matched
X8	2N185	Output		2N407		2N407	PNP } Pair

① Part #48A124347. Alternate 2N1108 coded red Part #48A124348.
② Part #48A124351. Alternate 2N1111 coded red Part #48A124352.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	MOTOROLA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1	50	12	23K643635	XPP-12050	NLW50-10	TT10X50	ML50-15	TE-1133	
C2	6	10	23K636769	XPP-10006	NLW6-25	TT12X5	ML6-15	TE-1085	
C3	6	6	23K636768	XPP-6006	NLW6-25	TT6X5	ML6-6	TE-1085	Note 1
C4	100	3	23K643636	XPP-3100	NLW100-6	TT6X100	ML100-3	TE-1059.5	

Note 1. Some versions may use 6mfd ③ 10V in this application (Part #23K636769).

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA						
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.	
C5	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10	
C6	30 N150 10%	#21R410048				*		10TCP-Q33	
C7	50000		BPD-05	DF-503	H-05S5	CCD-503	TA-150	5HK-S50	
C8	50000		BPD-05	DF-503	H-05S5	CCD-503	TA-150	5HK-S50	
C9	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20	
C10	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20	
C11	50000		BPD-05	DF-503	H-05S5	CCD-503	TA-150	5HK-S50	
C12	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50	
C13	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10	
C14	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20	
C15	50000		BPD-05	DF-503	H-05S5	CCD-503	TA-150	5HK-S50	
C16	50000		BPD-05	DF-503	H-05S5	CCD-503	TA-150	5HK-S50	
C17	50000		BPD-05	DF-503	H-05S5	CCD-503	TA-150	5HK-S50	
C18	10000		BPD-01	DD-203	BYB6S2	CCD-103	B-110	5HK-S10	
C19	1000		BPD-001	DD-102	BYA10D1M1	CCD-102	B-210	5HK-D10	

Motorola Part Number.
* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	MOTOROLA PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1	2500Ω	½	18B644600					Volume & Switch

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

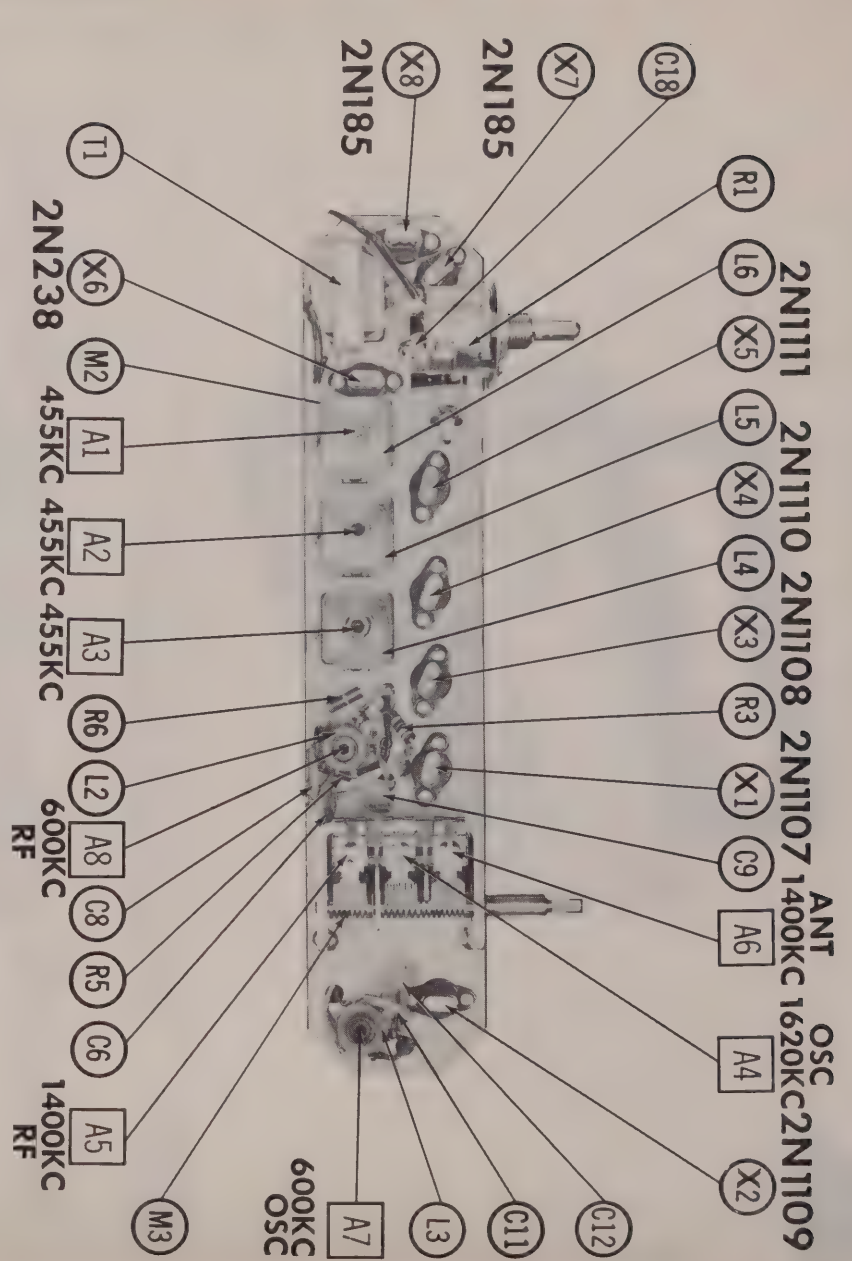
ITEM No.	RATING	REMARKS
R2	1000Ω	
R3	3900Ω	
R4	2200Ω	
R5	470Ω	
R6	1500Ω	
R7	12K	
R8	4700Ω	
R9	150Ω	
R10	3300Ω	

ITEM No.	RATING	REMARKS
R11	3900Ω	
R12	470Ω	
R13	2200Ω	
R14	12K	
R15	1000Ω	
R16	1000Ω	
R17	3900Ω	
R18	82K	
R19	2200Ω	

ITEM No.	RATING	REMARKS
R20	15K	
R21	1000Ω	
R22	1200Ω	
R23	47Ω	
R24	1200Ω	
R25	47Ω	
R26	1Ω	#17A643639
R27	1Ω	#17A643639
R28	220Ω	

Motorola Part Number.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		MOTOROLA PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	Loopstick	†						
L2	RF Coil	24B643632						
L3	Osc. Coil	24B643634						
L4	1st IF Trans.	24D643618						
L5	2nd IF Trans.	24D643618						
L6	3rd IF Trans.	24K643619						

† Part of Handle Assembly (Part #1V644062).

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA						NOTES
	PRI.	SEC.	MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	4	1 SEC. 2 1	25B643569						

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	MOTOROLA PART No.	QUAM PART No.	
SP1	4"	PM	35-37Ω	50C643469 50K644578 ①		① Alternate Part Number

BATTERIES

ITEM No.	VOLTAGE	MOTOROLA PART No.	REPLACEMENT DATA						NOTES
			BURGESS		EVEREADY		MALLORY		
			"A"	"B"	"A"	"B"	"A"	"B"	
M1	1.5V			1 ①		635 ①		M14M ①	① Six required.

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA				NOTES
		MOTOROLA PART No.	CBS PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
M2		48K640754	1N60	1N60	1N60	AM Detector

MISCELLANEOUS

ITEM No.	PART NAME	MOTOROLA PART No.	NOTES
M3	Tuning Cap.	19B643228	3 Gang Ant. 15-178mmf, RF 15-178mmf, Osc. 10-81mmf

CABINETS & CABINET PARTS

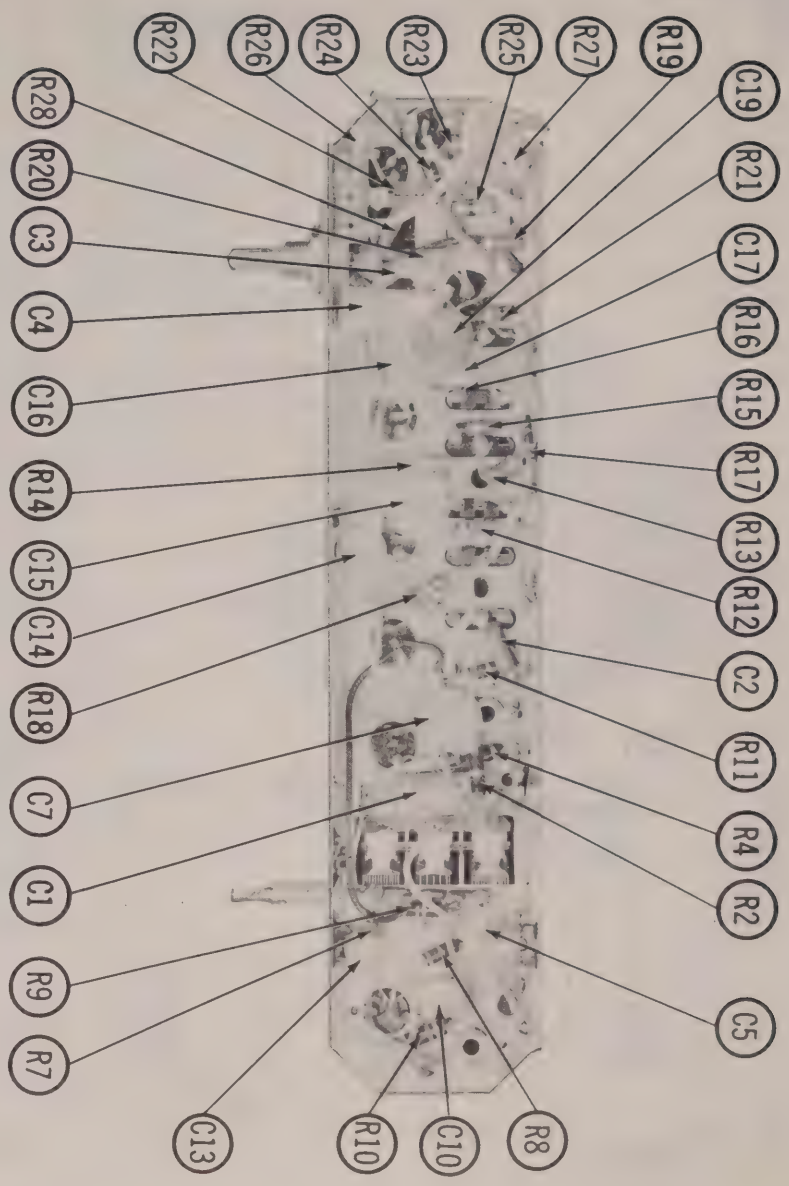
(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

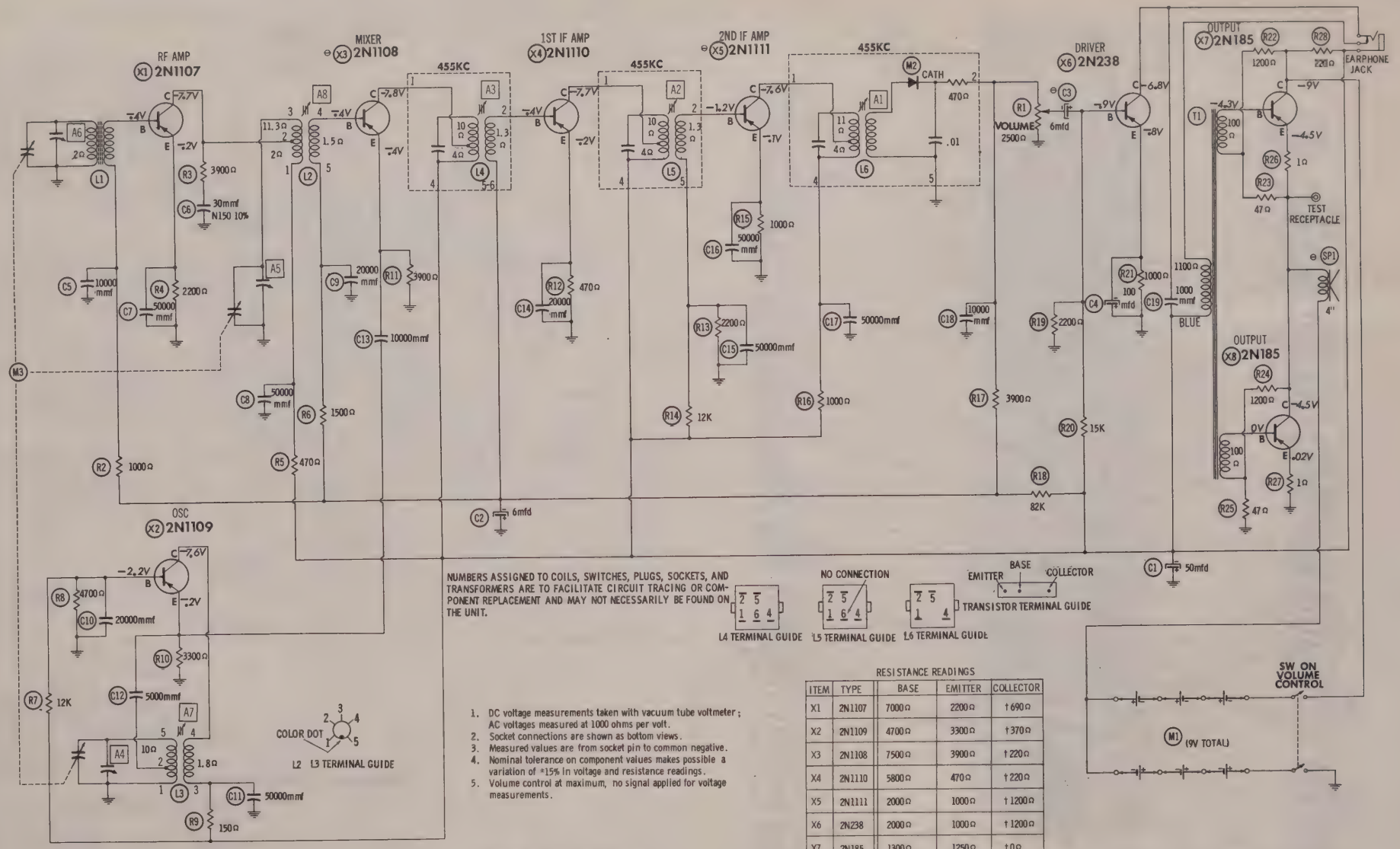
NAME	PART NO.	DESCRIPTION
Bezel	13C644597	
Knob	36B644598	Tuning
Knob	36B644601	Off-On Volume
Pointer	36C643624	
Dial Scale	34K644778	
Cabinet Back	1V644067	
Cabinet Front	1V644066	
Handle Assembly	1V644062	Includes L1

WIRING DATA

General-use Unshielded Hook-up Wire .....Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

CHASSIS—BOTTOM VIEW





NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
5. Volume control at maximum, no signal applied for voltage measurements.

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

RESISTANCE READINGS

ITEM	TYPE	BASE	EMITTER	COLLECTOR
X1	2N1107	7000Ω	2200Ω	†690Ω
X2	2N1109	4700Ω	3300Ω	†370Ω
X3	2N1108	7500Ω	3900Ω	†220Ω
X4	2N1110	5800Ω	470Ω	†220Ω
X5	2N1111	2000Ω	1000Ω	†1200Ω
X6	2N238	2000Ω	1000Ω	†1200Ω
X7	2N185	1300Ω	1250Ω	†0Ω
X8	2N185	150Ω	1Ω	†1200Ω

TRANSISTORS REMOVED FOR RESISTANCE MEASUREMENTS.
† MEASURED FROM JUNCTION OF R22 AND R28.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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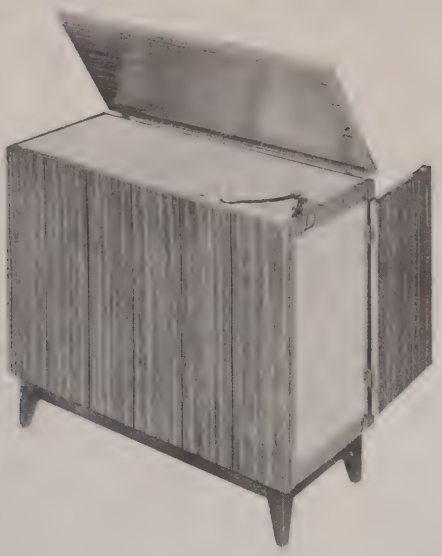
MOTOROLA MODEL L14E (Ch. HS-730)

PHOTOFACT® Folder

EIA

PHILCO
MODEL G-1710S

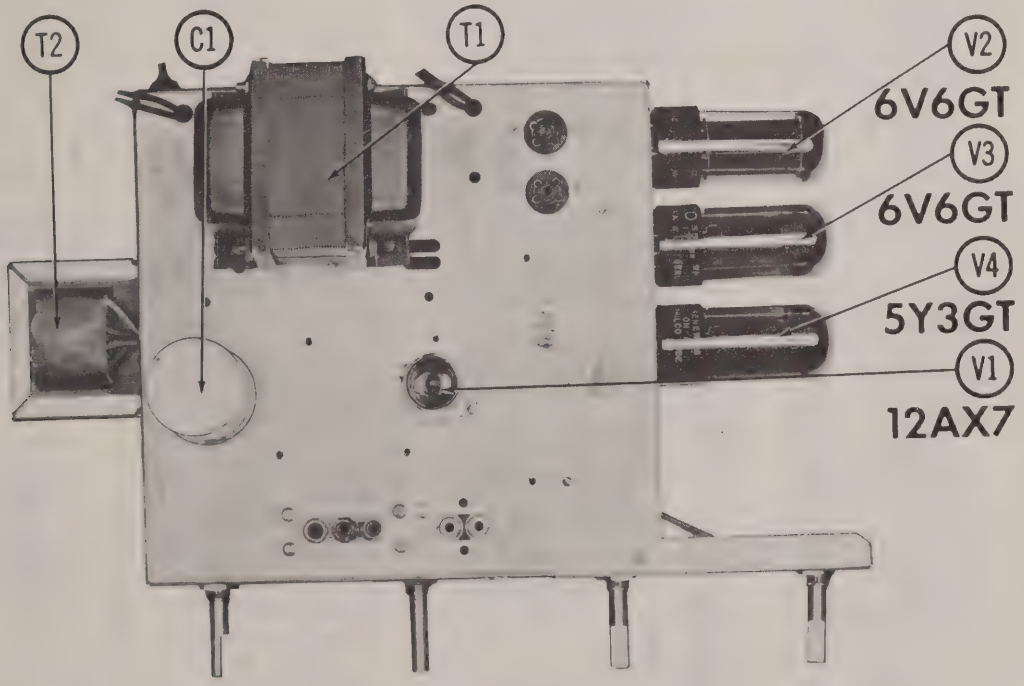
PHILCO
MODEL G-1710S



TRADE NAME	Philco Model G-1710S
MANUFACTURER	Philco Corp., Tioga & "C" Streets, Philadelphia, Pa.
TYPE SET	AC Operated 8 Tube Stereo Phono Amplifier With 4 Speed Automatic Record Changer
POWER SUPPLY	105-120 Volts AC, 60 Cycles RATING 50 Watts, .59 Amp. @117 Volts AC

FOR SERVICE INFORMATION ON RECORD CHANGER M-41 — SEE SIMILAR V-M 1200A —PHOTOFACT SET 353 FOLDER 16 OR RECORD CHANGER MANUAL RC-10.

PHILCO
MODEL G-1710S



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JT449

PARTS LIST AND DESCRIPTIONS

TUBES

◆ CBS ◆		GENERAL ELECTRIC ◆		RAYTHEON ◆		SYLVANIA ◆	
ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	AF Amplifier	12AX7	V3	Output	6V6GT
V2	Output	6V6GT	V4	Rectifier	5Y3GT

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	PHILCO PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1A	▲40	450	30-2590-38	AFH3-42	C0330	FP396.12	TMT-37	TVL-3784	
B	■20	450							
C	▲10	450							
C2	10	25	30-2417-8	PRS1250	BBR10-25	TC22	TD-10-25	TVA-1204	
C3	10	25	30-2417-8	PRS1250	BBR10-25	TC22	TD-10-25	TVA-1204	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C4	.0068 400V 10%		V84C4D68 10%		PM6D68	6DP-1-682	GEM-16268	6TM-D68
C5	.0047 400V 10%		V84C4D47 10%		PM6D47	6DP-1-472	GEM-16247	6TM-D47
C6	.0047 600V		P688N-0047	D6-472	CUB6D47	6DP-1-472	GEM-6247	6TM-D47
C7	.0047 600V		P688N-0047	D6-472	CUB6D47	6DP-1-472	GEM-6247	6TM-D47
C8	.047 600V		P688N-047	DF-503	CUB6S47	6DP-3-473	GEM-6147	6TM-S47
C9	.0022 1000V		P1088N-0022	DD-222	CUB10D22	16DP-2-222	GEM-10222	10TM-D22
C10	.0022 1000V		P1088N-0022	DD-222	CUB10D22	16DP-2-222	GEM-10222	10TM-D22
C11	.1 200V		P288N-1	DF-104	CUB2P1	2DP-3-104	GEM-201	2TM-P1
C12	2mfd 100V		P282Z-2		MP2W2			118P20502S2
C13	.01 600V		P688N-01	D6-103	CUB6S1	6DP-2-103	GEM-611	6TM-S1

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	PHILCO PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1	2meg	½	33-5535-47	BT-175				Loudness, Taps @ 200K & 1meg
R2A	1meg	½	33-5587-29	B-70	A47-1meg-Z	Q13-137	U53	
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	Bass
R3A	1meg	½	33-5587-29	B-70	A47-1meg-Z	Q13-137	U53	
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	Treble

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

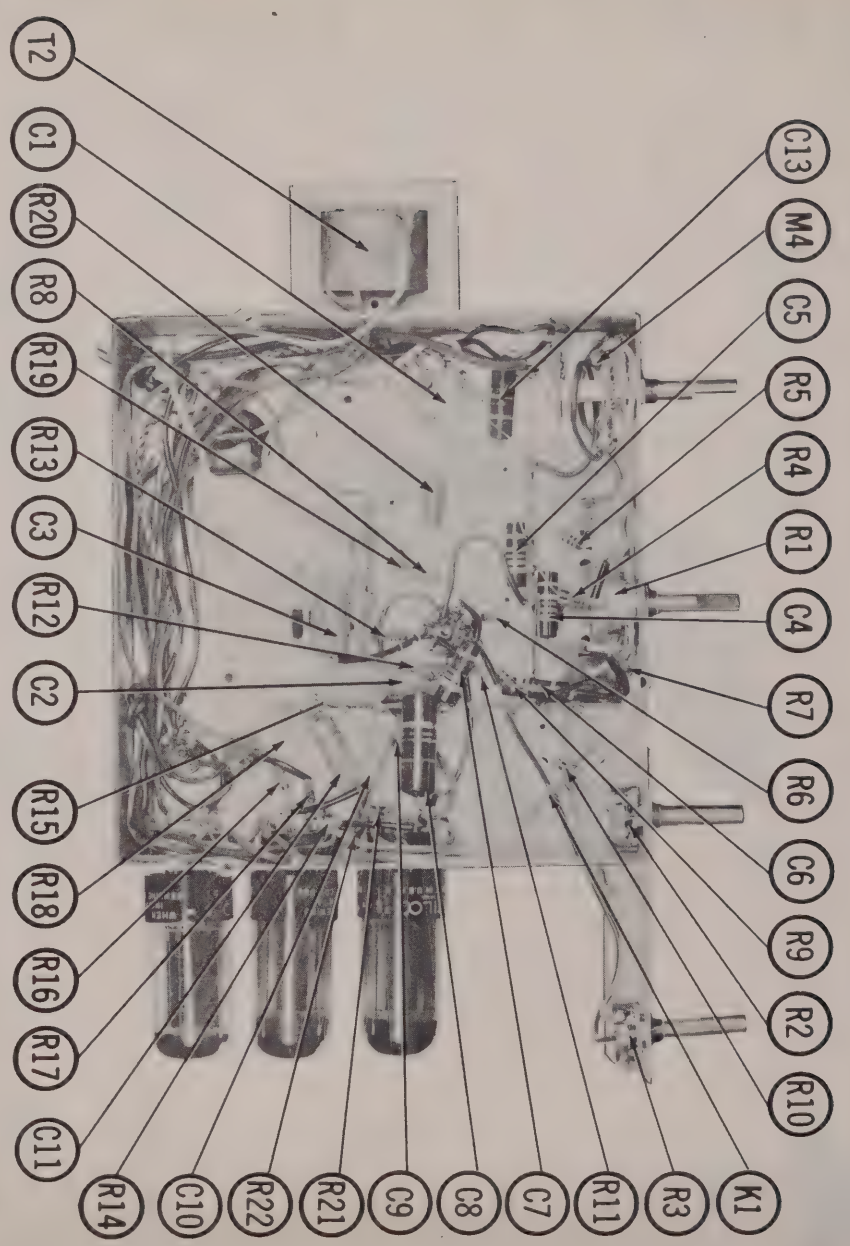
ITEM No.	RATING	REMARKS
R4	82K	
R5	22K	
R6	1meg	
R7	1meg	
R8	270K	
R9	2700Ω 5%	
R10	100K	

ITEM No.	RATING	REMARKS
R11	100K	
R12	270K	
R13	2700Ω	
R14	470K	
R15	3300Ω	
R16	4700Ω	
R17	4.7meg	

ITEM No.	RATING	REMARKS
R18	270Ω 5W	#33-1335-91
R19	10K	
R20	3300Ω 2W	
R21	56Ω	
R22	56Ω	
R23	1meg	

Philco Part Number.

CHASSIS—BOTTOM VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	PHILCO PART No.	REPLACEMENT DATA
K1	Tone Compensation	68mmf, 1000mmf, 1000mmf, 10000mmf, 22K, 220K	30-6038-1	

PHONO CARTRIDGE

ITEM No.	PHILCO PART No.	REPLACEMENT DATA							
		ASTATIC PART No.		ELECTRO-VOICE PART No.		JENSEN PART No.		SONOTONE PART No.	
		CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE
M2		13T	Not Req.	66	Not Req.			8TAS-4	N-8TA-S

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA						
				PHILCO PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
	PRI.	SEC. 1	SEC. 2							
T1	117V Ⓐ .59A	680 VCT Ⓐ .070A	5V Ⓐ 2A	32-8790-4	24R40U	P-3153		PC8408	24R40U	R-11A
	SEC. 3	SEC. 4	SEC. 5							
	6.3V Ⓐ 1.3A									

PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA			REMARKS
	PHILCO PART No.	CLEVITE WALCO PART No.	JENSEN PART No.	
M3	(78 RPM)	W-101STS † or W-101STD ♦	E98 † or E98D ♦	† Jewel ♦ Diamond
	(LP)	W-102S † or W-102MGD ♦	E98X † or E98XD ♦	

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
			PHILCO PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
	PRI.	SEC.								
T2	9000Ω CT	DC RES.	32-8891-1							
		3.6Ω Taps Ⓐ 1.2Ω, .2Ω								

MISCELLANEOUS

ITEM No.	PART NAME	PHILCO PART No.	NOTES
M4	Switch	42-2107-2	Function Selector Used in Run 52 & higher.
	Switch	42-2107-1	Function Selector Used prior to Run 52.

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	PHILCO PART No.	QUAM PART No.	
SP1	10"	PM	3-4Ω	36-1653-7	10A6A	
SP2	3½"	PM	6-8Ω	36-1652-2	3A07Z8.5	
SP3	ELECTROSTATIC			36-1656-1		

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	54-6271-4	Loudness, Bass, Treble, Function Selector

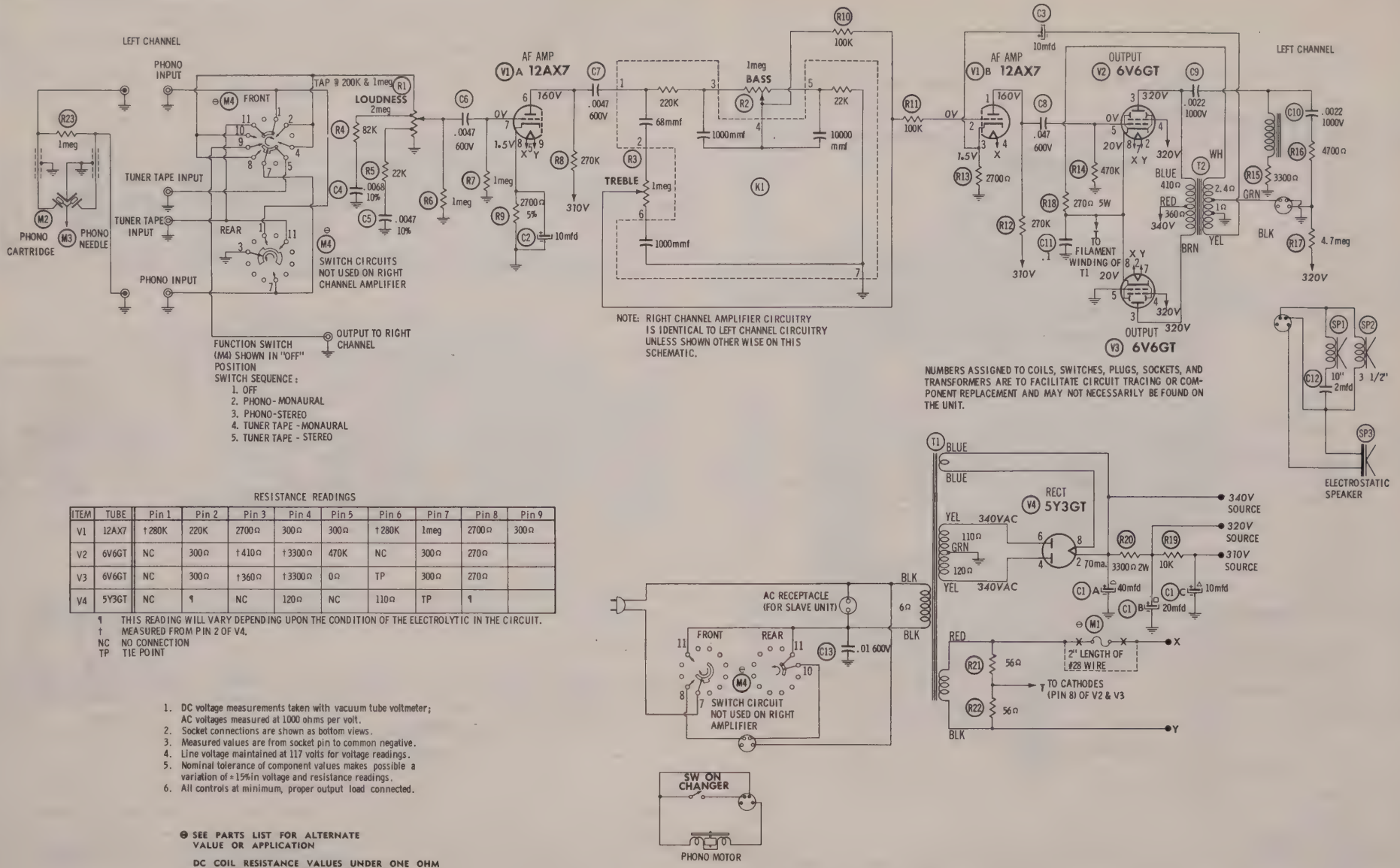
FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			PHILCO PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	2" Length #28 Wire ①							

① Not used in some versions.

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors
Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)
Low-Loss Shielded Lead (Interconnecting) .....Use BELDEN No. 8401
Phono Pick-up Arm Cable ..... Use BELDEN No. 8430 (Two Conductor - Twisted)


LEFT CHANNEL
PHONO INPUT
TUNER TAPE INPUT
TUNER TAPE INPUT
PHONO INPUT
PHONO CARTRIDGE
PHONO NEEDLE
FRONT
REAR
TAP @ 200K & 1meg
LOUDNESS
2meg
SWITCH CIRCUITS NOT USED ON RIGHT CHANNEL AMPLIFIER
FUNCTION SWITCH (M4) SHOWN IN "OFF" POSITION
SWITCH SEQUENCE:
1. OFF
2. PHONO-MONAURAL
3. PHONO-STEREO
4. TUNER TAPE -MONAURAL
5. TUNER TAPE - STEREO
OUTPUT TO RIGHT CHANNEL
AF AMP V1A 12AX7
TREBLE
BASS
NOTE: RIGHT CHANNEL AMPLIFIER CIRCUITRY IS IDENTICAL TO LEFT CHANNEL CIRCUITRY UNLESS SHOWN OTHER WISE ON THIS SCHEMATIC.
AF AMP V1B 12AX7
OUTPUT V2 6V6GT
OUTPUT V3 6V6GT
TO FILAMENT WINDING OF T1
LEFT CHANNEL
NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.
ELECTROSTATIC SPEAKER
RECT V4 5Y3GT
340V SOURCE
320V SOURCE
310V SOURCE
AC RECEPTACLE (FOR SLAVE UNIT)
SWITCH CIRCUIT NOT USED ON RIGHT AMPLIFIER
2" LENGTH OF #28 WIRE
TO CATHODES (PIN 8) OF V2 & V3
SW ON CHANGER
PHONO MOTOR

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12AX7	†280K	220K	2700Ω	300Ω	300Ω	†280K	1meg	2700Ω	300Ω
V2	6V6GT	NC	300Ω	†410Ω	†3300Ω	470K	NC	300Ω	270Ω	
V3	6V6GT	NC	300Ω	†360Ω	†3300Ω	0Ω	TP	300Ω	270Ω	
V4	5Y3GT	NC	¶	NC	120Ω	NC	110Ω	TP	¶	

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
† MEASURED FROM PIN 2 OF V4.
NC NO CONNECTION
TP TIE POINT

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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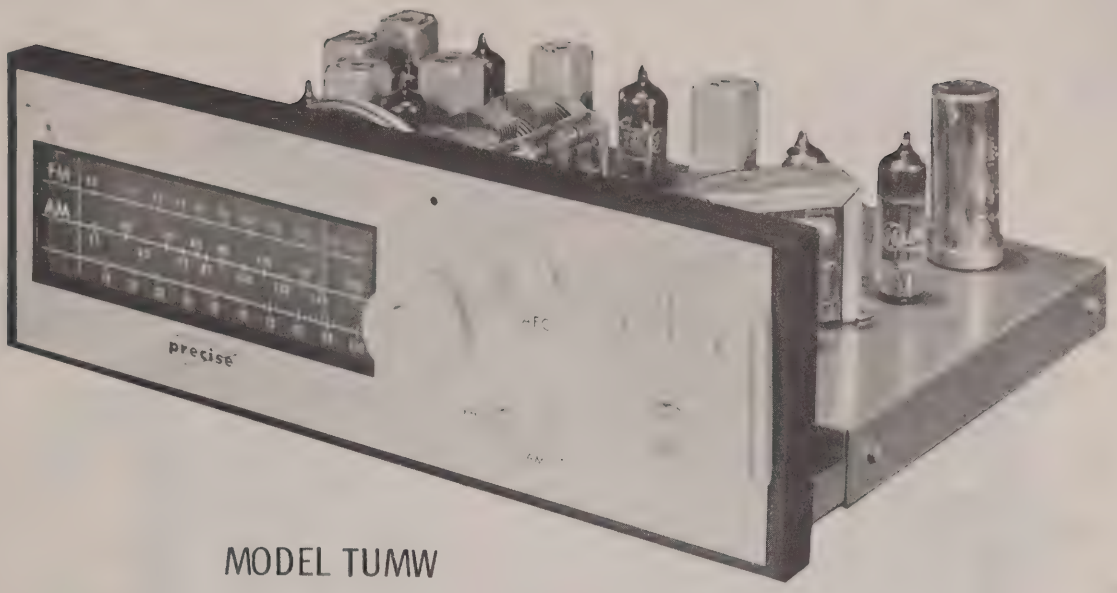
PHILCO MODEL G-1710S

PHOTOFACT® Folder

PRECISE MODELS
TUMK, TUMW

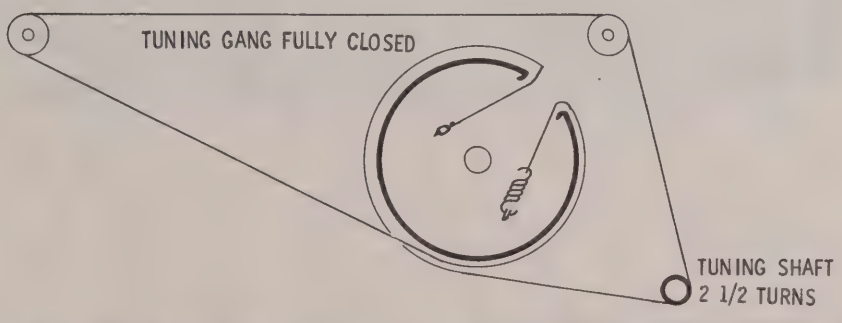


MODEL TUMW

PRECISE MODELS
TUMK, TUMW

TRADE NAME	Precise Models TUMK, TUMW		
MANUFACTURER	Precise Development Corp., Oceanside, N. Y.		
TYPE SET	AC Operated 8 Tube FM-AM Tuner		
POWER SUPPLY	110-120 Volts AC, 60 Cycles	RATING	38 Watts, .4 Amp. @ 117 Volts AC (FM)
TUNING RANGE	BROADCAST 535 - 1620KC	FREQ. MOD.	88 - 108MC

DIAL CORD STRINGING



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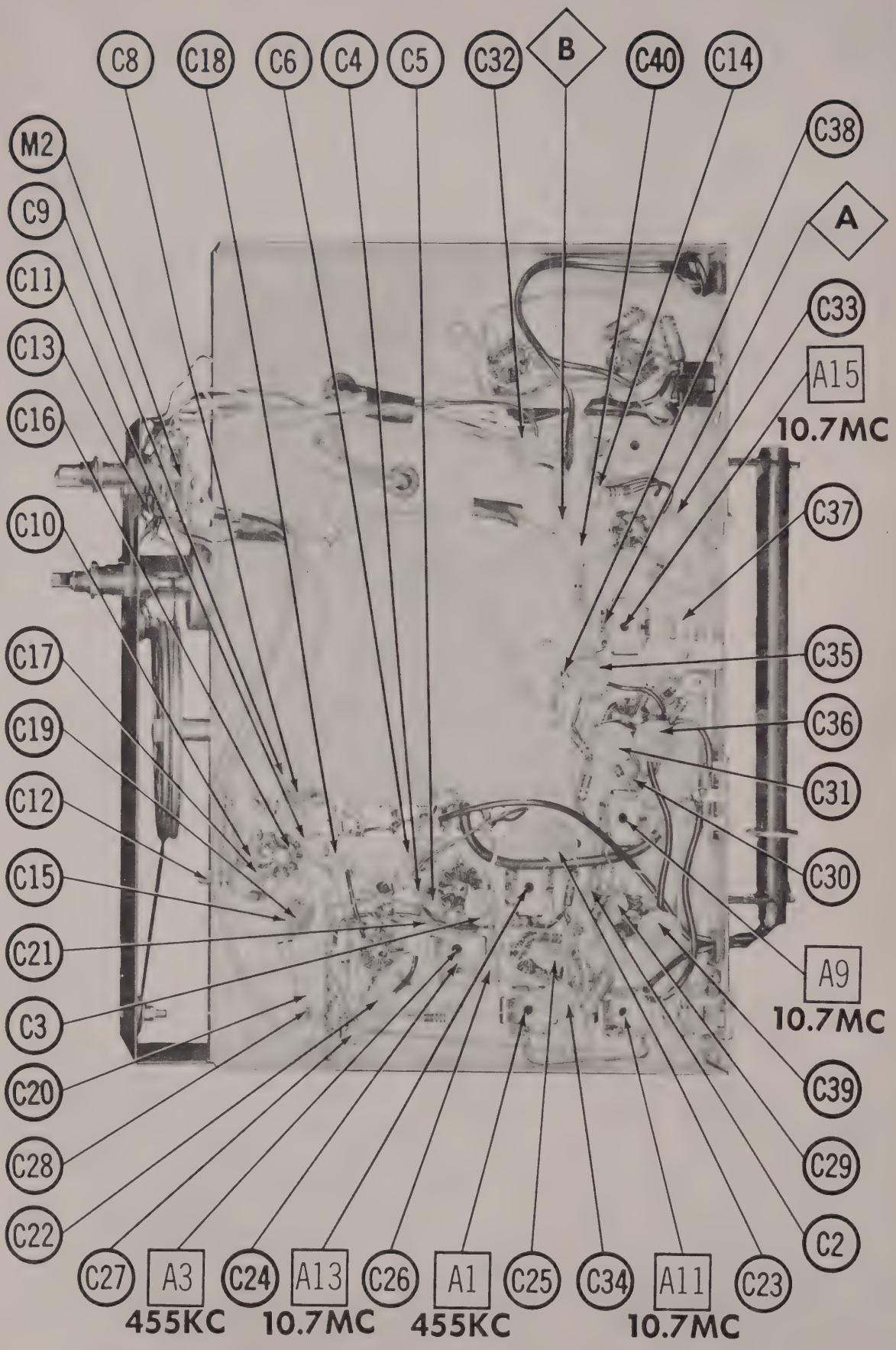
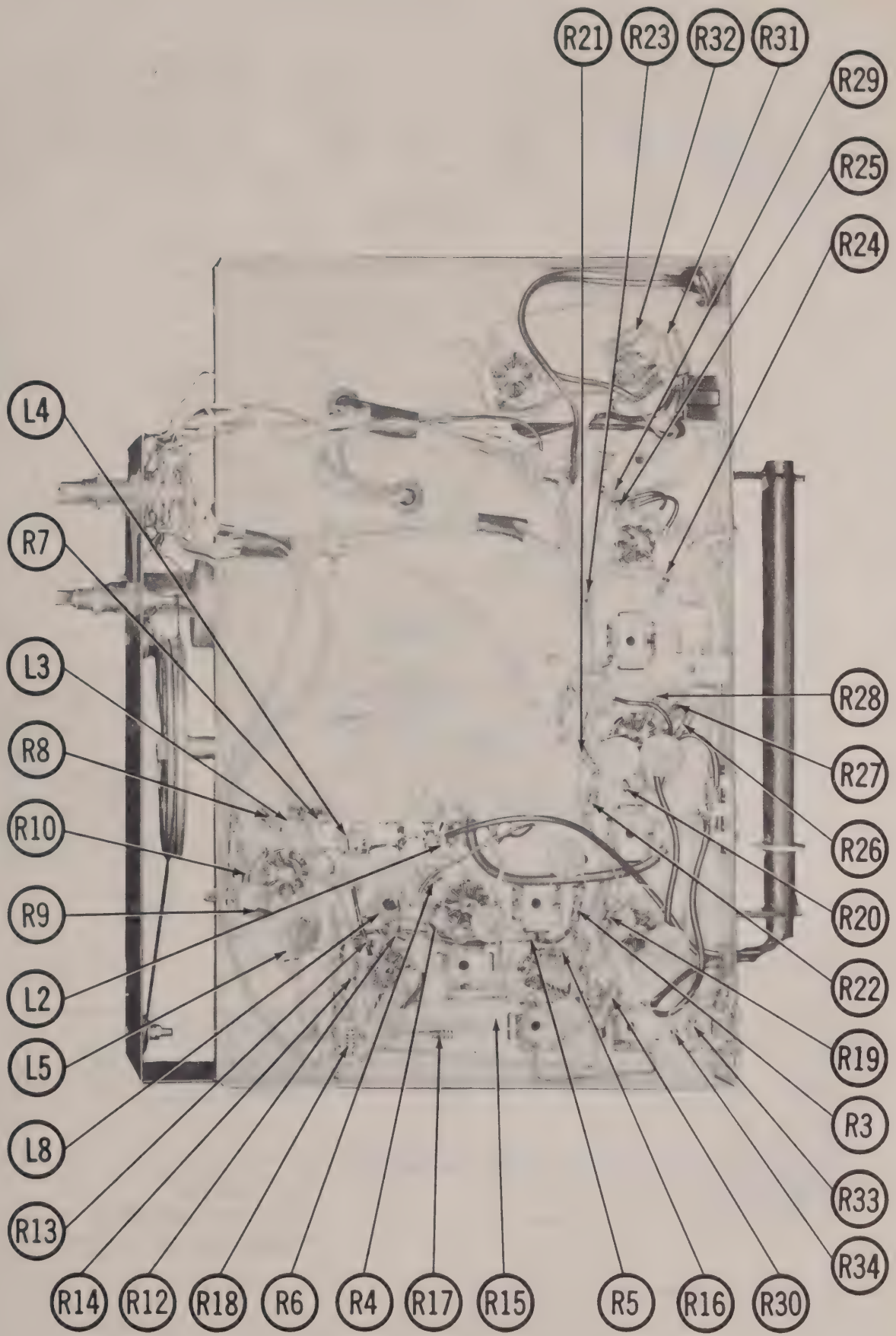
the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1960 Howard W. Sams & Co., Inc., Indianapolis 6, Indiana. Printed in U.S. of America

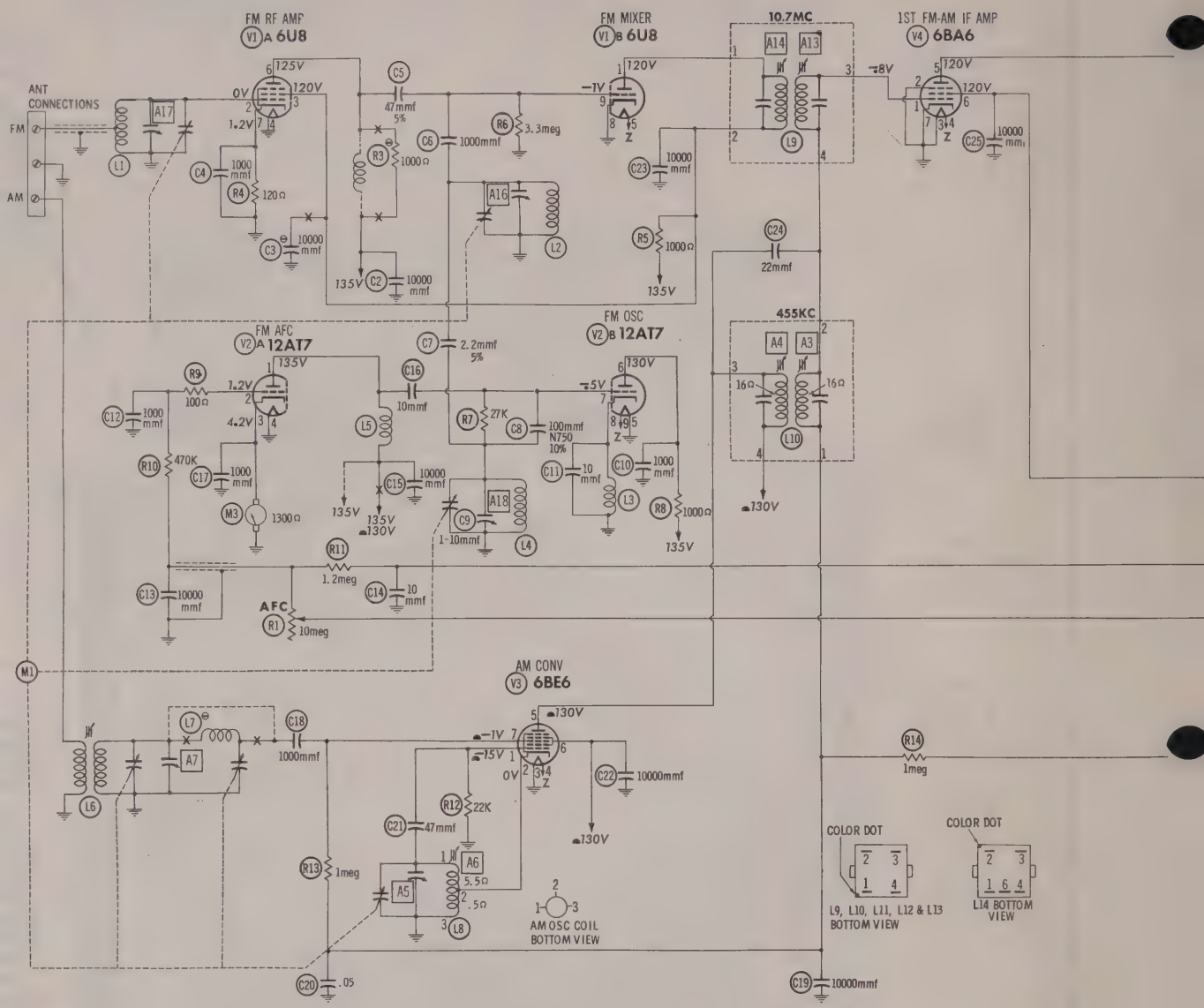
SET 470 FOLDER 18



CHASSIS BOTTOM VIEW-CAPACITOR AND ALIGNMENT IDENTIFICATION



CHASSIS BOTTOM VIEW-RESISTOR AND INDUCTOR IDENTIFICATION



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6U8	†1600Ω	0Ω	†1600Ω	0Ω	.1Ω	†1600Ω	120Ω	0Ω	3.3meg
V2	12AT7	†660Ω	500K	1300Ω	0Ω	0Ω	†1600Ω	27K	.7Ω	.1Ω
V3	6BE6	▲22K	▲.7Ω	0Ω	.1Ω	†▲660Ω	†▲660Ω	▲2.5meg		
V4	6BA6	1.5meg	0Ω	0Ω	.1Ω	†5300Ω	†5300Ω	0Ω		
V5	6AU6	520K	0Ω	.1Ω	0Ω	†1600Ω	†1600Ω	0Ω		
V6	6U8	†660Ω	100K	†7000Ω	0Ω	.1Ω	†7000Ω	0Ω	5200Ω	1.2meg
V7	6AL5	2500Ω	100K	0Ω	.1Ω	190K	0Ω	100K		
V8	6X4	270Ω	NC	.1Ω	0Ω	NC	280Ω	¶		

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
ALL MEASUREMENTS TAKEN IN "FM" POSITION UNLESS OTHERWISE DESIGNATED.
† MEASURED FROM PIN 7 OF V8.
■ MEASURED FROM PIN 8 OF V6.
▲ MEASURED IN "AM" POSITION. NC NO CONNECTION

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. No signal applied for voltage measurements.

Θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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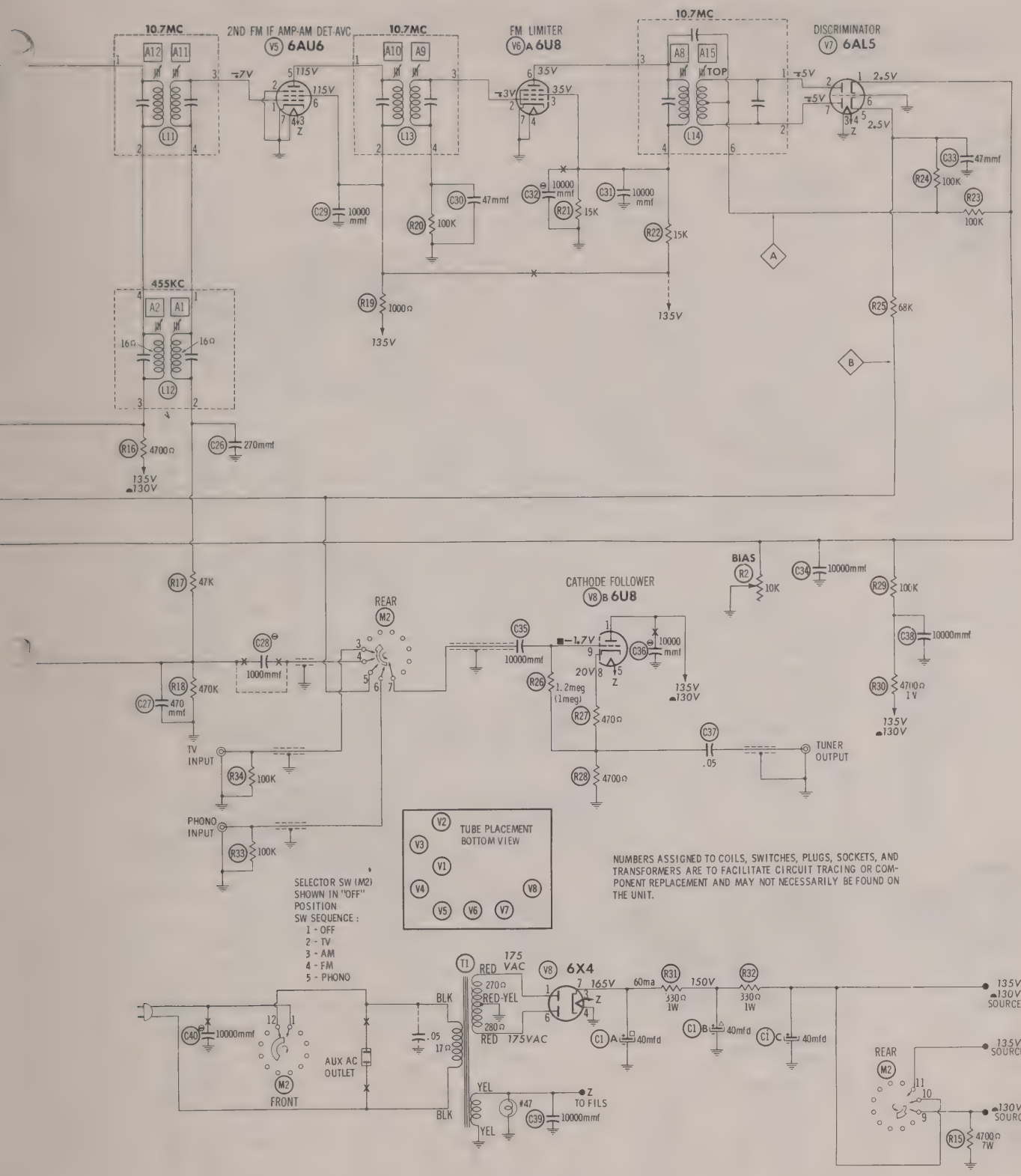

PRECISE MODELS
TUMK, TUMW

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested Alignment Tools:
- A1 thru A4, A8 thru A15 ..... GENERAL CEMENT #5097, 8727; WALSCO #2515
- A5, A7, A16, A17 ..... GENERAL CEMENT #5004, 5008, 5009; WALSCO #2520
- A6 ..... GENERAL CEMENT #8721, 8722; WALSCO #2519

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.01mfd	High side to pin 7 (grid) of AM Converter. Low side to chassis.	455KC (400∿ Mod.)	AM	Tuning gang fully open	Across output jack	A1, A2, A3, A4	Adjust for maximum output.
2.		Loop	1620KC	"	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		"	600KC	"	Tune to 600KC signal	"	A6	"
4.		"	1400KC	"	Tune to 1400KC signal	"	A7	Adjust for maximum output while rocking tuning gang.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
5.	.001mfd	High side to pin 9 (grid) of FM Mixer. Low side to chassis.	10.7MC (Unmod.)	FM (AFC fully counter-clockwise)	Point of non-interference	DC probe to point Ⓐ. Common to chassis.	A8, A9, A10, A11, A12, A13 A14	Adjust for maximum deflection.
6.	"	"	"	"	"	DC probe to point Ⓑ. Common to chassis.	A15	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
5.	.001mfd	High side to pin 9 (grid) of FM Mixer. Low side to chassis.	10.7MC (450KC Swp.)	FM (AFC fully counter-clockwise)	Point of non-interference	Vert. Amp. to point Ⓐ. Low side to chassis	A8, A9, A10, A11, A12, A13, A14	Adjust for maximum gain and symmetry of response similar to Fig. 1.
6.	"	"	"	"	"	Vert. Amp. to point Ⓑ. Low side to chassis.	A15	Adjust to place marker at the center of crossover lines similar to Fig. 2. SLIGHTLY retouch A8 for maximum amplitude and straightness of crossover lines.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
7.		Across FM antenna terminals.	96MC (Unmod.)	FM (AFC fully counter-clockwise)	96MC	DC probe to point Ⓐ. Common to chassis.	A16, A17, A18	Adjust for maximum deflection.

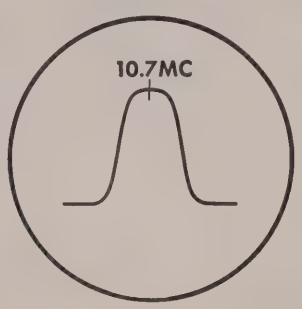

FIG. 1

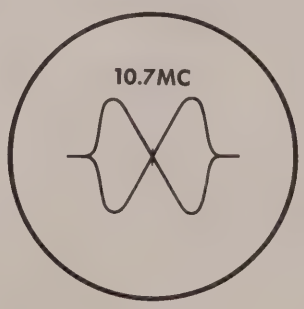

FIG. 2

CHASSIS TOP VIEW

PRECISE MODELS
TUMK, TUMW

PARTS LIST AND DESCRIPTIONS

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)

TUBES

◆ CBS ◆ GENERAL ELECTRIC ◆ RAYTHEON ◆ SYLVANIA ◆

ITEM No.	USE	TYPE
V1	FM RF Amp. - Mixer	6U8
V2	FM Osc. - AFC	12AT7
V3	AM Converter	6BE6
V4	1st FM - AM IF Amplifier	6BA6
V5	2nd FM IF Amplifier - AM Det. - AVC	6AU6
V6	FM Limiter - Cath. Foll.	6U8
V7	Discriminator	6AL5
V8	Rectifier	6X4

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA PRECISE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	■40	150		AFH3-10	C0090	FP311.5	TMT-9	TVL-3440	
B	▲40	150							
C	40	150							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C2	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C3	10000	①	BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C4	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C5	47 5%			DTZ-47	C10Q47C	CM-20B-470J	CNO-447	10TCC-Q47
C6	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C7	2.2 5%		NPO-DI 2.2	DTZ-2R2	C10V22C	CCTO-2R2	CNO-522	10TCC-V22
C8	100 N750 10%		N750-DI 100	DTN-100	C10T1U	CCTN-101	CN7-310	10TCU-T10
C9	1-10			829-10				
C10	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C11	10		DI-10	DD-100	L10Q1	CCD-100	GP-410	10TS-Q10
C12	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C13	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C14	10		DI-10	DD-100	L10Q1	CCD-100	GP-410	5GA-Q10
C15	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C16	10		DI-10	DD-100	L10Q1	CCD-100	GP-410	10TS-Q10
C17	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C18	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C19	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C20	.05 400V		P488N-05	DF-503	CUB4S5	4DP-3-503	GEM-415	4TM-S5
C21	47		DI-47	DD-470	L10Q47	CCD-470	GP-447	10TS-Q47
C22	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C23	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C24	22		DI-22	DD-220	L10Q22	CCD-220	GP-422	10TS-Q22
C25	10000		BPD-01	DD-102	BYA10S1	CCD-103	B-110	5HK-S10
C26	270		DI-270	DD-271	L10T27	CCD-271	GP-327	10TS-T27
C27	470		DI-470	DD-471	L10T47	CCD-471	GP-347	10TS-T47
C28	1000	①	BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C29	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C30	47		DI-47	DD-470	L10Q47	CCD-470	GP-447	10TS-Q47
C31	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C32	10000	①	BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C33	47		DI-47	DD-470	L10Q47	CCD-470	GP-447	10TS-Q47
C34	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C35	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C36	10000	①	BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C37	.05 400V		P488N-05	DF-503	CUB4S5	4DP-3-503	GEM-415	4TM-S5
C38	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C39	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C40	10000	①	BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10

① Not used in some versions.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA PRECISE PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	10meg	½	BA211-2134	B-98	A47-10meg-S	Q11-143	U82	AFC
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
R2A	10K		BA269-030	AB-14	A47-10K-S	B11-116	SU-26	Bias
B	Shaft			AK-1	FKS-1/4	SK2	Not Req.	

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R3	1000Ω	Note 1
R4	120Ω	
R5	1000Ω	
R6	3.3meg	
R7	27K	
R8	1000Ω	
R9	100Ω	
R10	470K	
R11	1.2meg	
R12	22K	
R13	1meg	

ITEM No.	RATING	REMARKS
R14	1meg	
R15	4700Ω 7W	
R16	4700Ω	
R17	47K	
R18	470K	
R19	1000Ω	
R20	100K	
R21	15K	
R22	15K	
R23	100K	
R24	100K	

ITEM No.	RATING	REMARKS
R25	68K	
R26	1.2meg	(1meg) *
R27	470Ω	
R28	4700Ω	
R29	100K	
R30	4700Ω 1W	
R31	330Ω 1W	
R32	330Ω 1W	
R33	100K	
R34	100K	

Note 1. Not used in some versions. * Alternate

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA PRECISE PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	NOTES
L1	FM Antenna Coil							
L2	FM RF Coil							
L3	Cathode Choke		19-1000	19-1000	BC-561	4602		1uh ①
L4	FM Osc. Coil							
L5	RF Choke		19-1000	19-1000	BC-561	4602		1uh ①
L6	Loopstick							②
L7	AM Antenna Coil							
L8	AM Osc. Coil		14-1055	14-1055	BC-393			
L9	1st FM IF Trans.	1607-1	16-3487	16-3487	FM-254	1463		
L10	1st AM IF Trans.	1655-6	16-6758	16-6758	BC-352	12-C1	RF-1	
L11	2nd FM IF Trans.	1607-5	16-3487	16-3487	FM-254	1463		
L12	2nd AM IF Trans.	1655-6	16-6758	16-6758	BC-353	12-C2	RF-2	
L13	3rd FM IF Trans.	1607-1	16-3487	16-3487	FM-254	1463		
L14	Discriminator	ED-531	17-3494	17-3494	FM-253	1464		

① IRC Part #CLA. ② Not used in some versions.

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	REPLACEMENT DATA PRECISE PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V ② .40A	350VCT ② .060A	6.3V ③ 2.8A	PT-100						

MISCELLANEOUS

ITEM No.	PART NAME	PRECISE PART No.	NOTES
M1	Tuning Cap.		FM-AM, 5 Gang (AM Sections: Ant. 12-238mmf, Ant. 18-274mmf, Osc. 11-119mmf)
M2	Switch		Function
M3	Meter		FM Tuning

PHOTOFACT® Folder

SHERWOOD
MODEL S-4000

SHERWOOD
MODEL S-4000

SHERWOOD
MODEL S-4000

TRADE NAME	Sherwood Model S-4000
MANUFACTURER	Sherwood Electronic Laboratories, Inc., 4300 N. California Ave., Chicago 18, Illinois
TYPE SET	AC Operated 7 Tube Audio Amplifier
POWER SUPPLY	110-120 Volts AC, 60 Cycles RATING 69 Watts, .71 Amp. @ 117 Volts AC

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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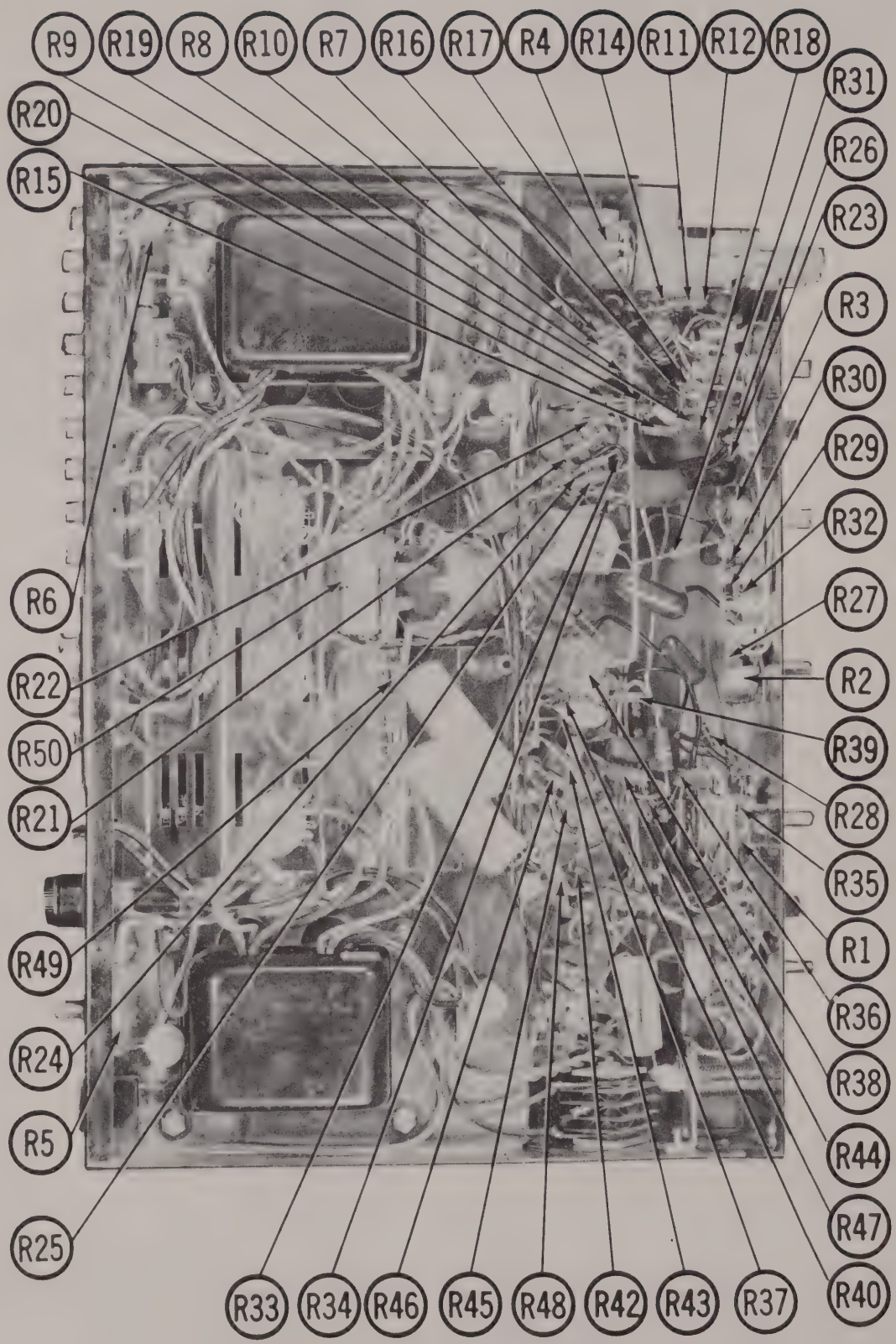
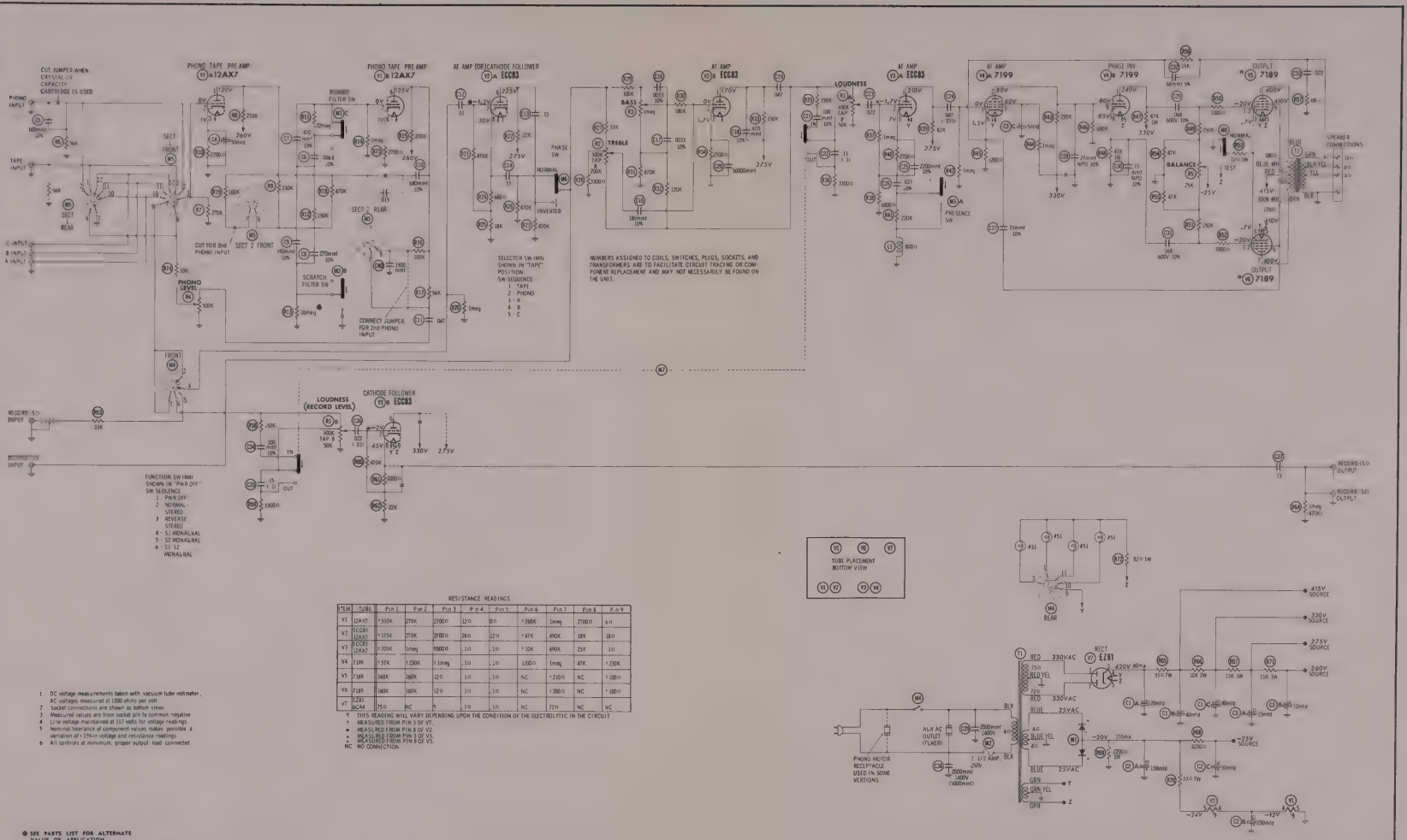
SET 470 FOLDER 19



CHASSIS BOTTOM VIEW - RESISTOR IDENT. (R1-R50)


CUT JUMPER WHEN CRYSTAL OR CAPACITY CARTRIDGE IS USED
PHONO TAPE PRE AMP V1a 12AX7
PHONO TAPE PRE AMP V1b 12AX7
AF AMP (OR) CATHODE FOLLOWER V2a ECC83
AF AMP V3b ECC83
LOUDNESS
AF AMP V3a ECC83
AF AMP V4a 7199
PHASE INV V4b 7199
OUTPUT V5 7189
OUTPUT V6 7189
SPEAKER CONNECTIONS
PHONO INPUT
TAPE INPUT
SECT 1 FRONT
SECT 2 REAR
SECT 2 FRONT
SECT 1 REAR
CUT FOR 2nd PHONO INPUT
SCRATCH FILTER SW
RUMBLE FILTER SW
PHONO LEVEL
CONNECT JUMPER FOR 2nd PHONO INPUT
PHASE SW
NORMAL
INVERTED
BASS
TREBLE
PRESENCE SW
BALANCE
SELECTOR SW (M6) SHOWN IN "TAPE" POSITION SW SEQUENCE 1 TAPE 2 PHONO 3 - A 4 B 5 - C
NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.
RECORD (S1) INPUT
RECORD (S2) INPUT
LOUDNESS (RECORD LEVEL)
CATHODE FOLLOWER V3b ECC83
RECORD (S1) OUTPUT
RECORD (S2) OUTPUT
FUNCTION SW (M8) SHOWN IN "PWR OFF" SW SEQUENCE 1 PWR OFF 2 NORMAL-STEREO 3 REVERSE STEREO 4 - S1 MONAL/AL 5 - S2 MONAL/AL 6 - S1 S2 MONAL/RAL
TUBE PLACEMENT BOTTOM VIEW
REAR
PHONO MOTOR RECEPTACLE USED ON SOME VERSIONS
AUX AC OUTLET (TUNER)
RECT EZ81
415V SOURCE
330V SOURCE
275V SOURCE
260V SOURCE
-75V SOURCE
-24V
-12V

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12AX7	*100K	270K	2700Ω	12Ω	0Ω	*280K	1meg	2700Ω	0Ω
V2	ECC83 12AX7	*175K	270K	2700Ω	26Ω	12Ω	*47K	490K	18K	18Ω
V3	ECC83 12AX7	*105K	1meg	9900Ω	1Ω	1Ω	*10K	490K	25K	1Ω
V4	7199	*57K	1250A	1.1meg	1Ω	1Ω	1200Ω	1meg	47K	*230K
V5	7189	160K	160K	12Ω	1Ω	1Ω	NC	*210Ω	NC	*100Ω
V6	7189	160K	160K	12Ω	1Ω	1Ω	NC	*200Ω	NC	*100Ω
V7	EZ81 RECT	175Ω	NC	NC	1	1Ω	1Ω	NC	72Ω	NC	NC

* THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT
† MEASURED FROM PIN 3 OF V1.
◆ MEASURED FROM PIN 8 OF V2.
▲ MEASURED FROM PIN 3 OF V3.
• MEASURED FROM PIN 8 OF V3.
NC NO CONNECTION

1 DC voltage measurements taken with vacuum tube voltmeter, AC voltages measured at 1000 ohms per volt.
2 Socket connections are shown as bottom views.
3 Measured values are from socket pin to common negative.
4 Line voltage maintained at 117 volts for voltage readings.
5 Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
b All controls at minimum, proper output load connected.

⊕ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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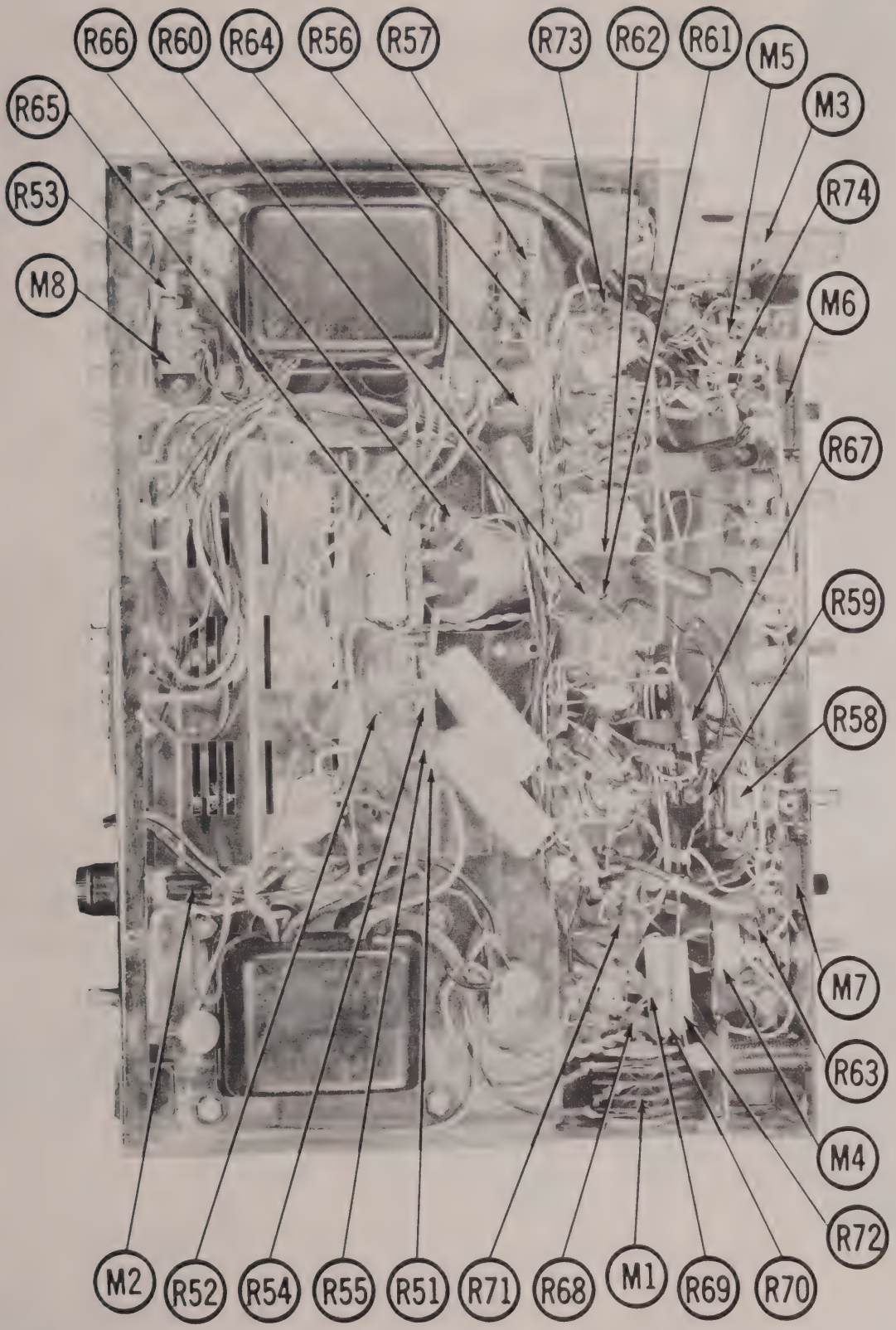
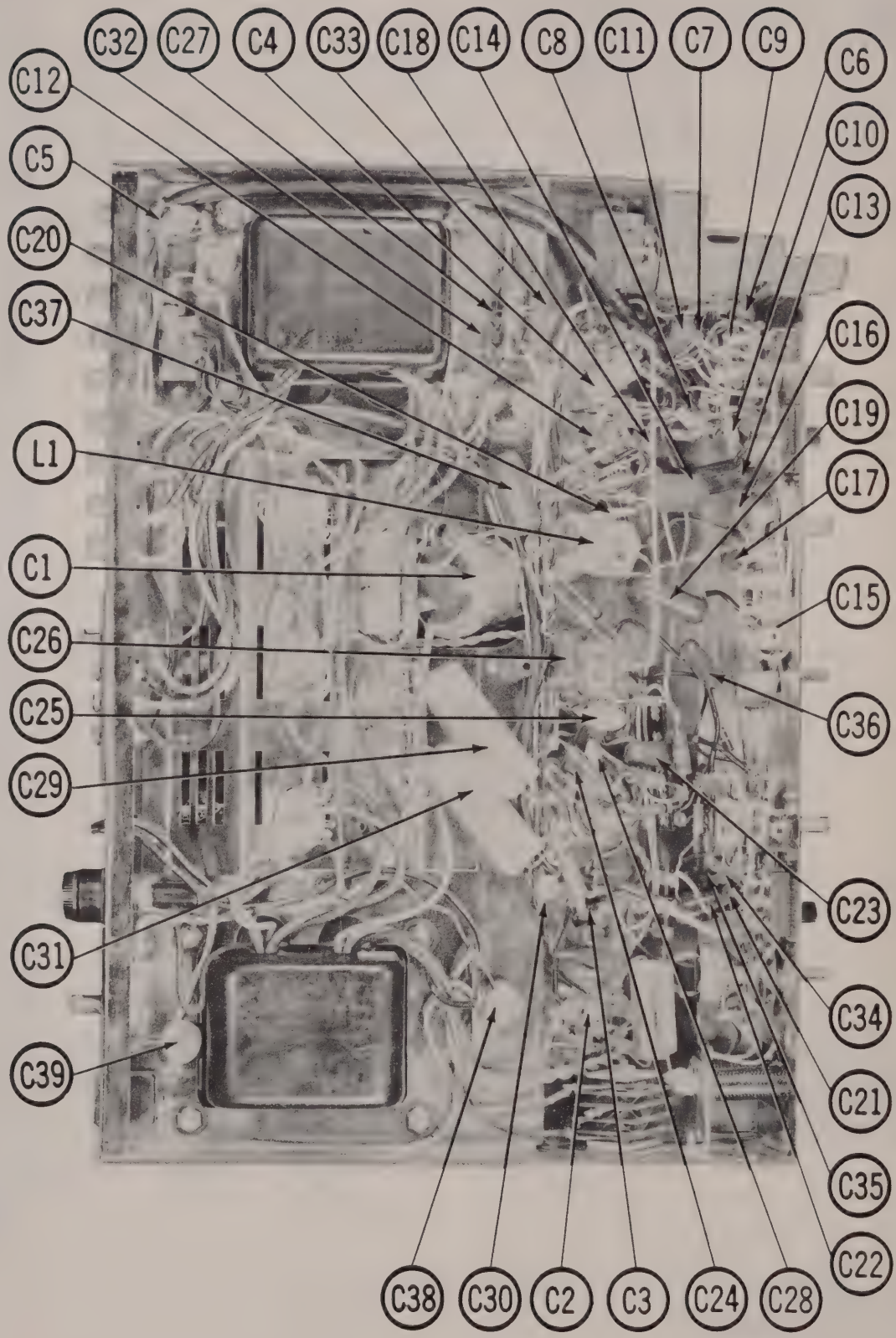
SHERWOOD MODEL S-4000



CHASSIS BOTTOM VIEW - RESISTOR (R51-R74) & MISC. IDENT.



CHASSIS BOTTOM VIEW - CAPACITOR & INDUCTOR IDENT.

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	TYPE
V1	Phono-Tape Preamp.	12AX7
V2	AF Amp. (or) Cath. Follower	ECC83/ 12AX7
V3	AF Amp.-Cath. Follower	ECC83/ 12AX7
V4	AF Amp.-Phase Inv.	7199
V5	Output	7189 (6BQ5)*
V6	Output	7189 (6BQ5)*
V7	Rectifier	EZ81 6CA4

* Alternate.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA SHERWOOD PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	▲20	500	120AB4	AFH3-54	D0185	FP288	TMD-62	TVLS-3966*	
B	▲40	500				TC83	TD-20-500		
C	■40	500							
C2A	▲150	50	120AB6-8					TVLS-3340*	
B	■250	50							
C	▲50	50							
C3A	■15	400	120B8		B0290		TMD-41	TVLS-3686.2*	
B	▲10	400			BBR4-250		TD-4-450		
C	5	250							
C4	50	6	CE8506	PWE6050	NL50-6	TT6X50	ML50-6	TVA-1100	

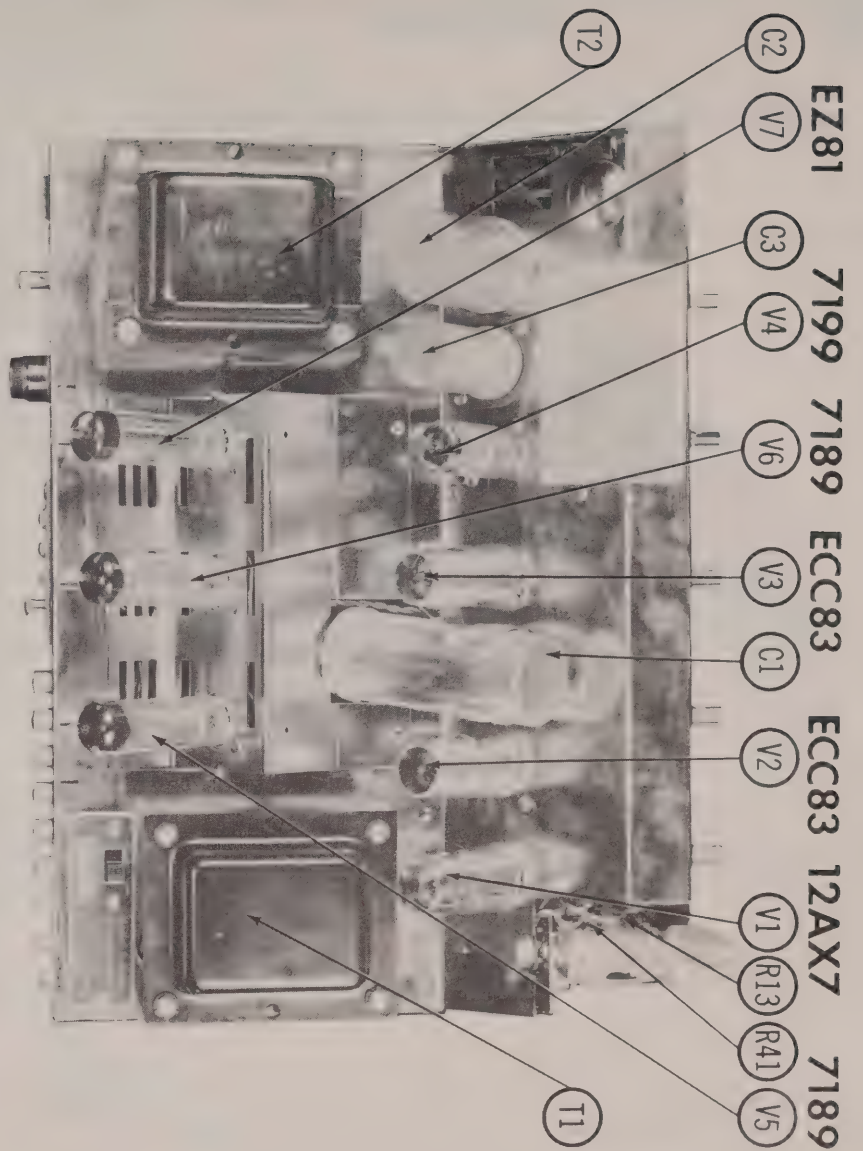
* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C5	100 10%		1469-0001	D6-101	22R5T1	CM-20B-101K	MCB235	MS-31
C6	.0068 400V 10%		V84C4D68		PM6D68	6DP-1-682	GTM-4268	6TM-D68
C7	470 10%		DI-470	MD-471	22R5T47	CCS-471	JL-347	MS-347
C8	270 10%		DI-270	MD-271	L10T27	CCD-271		MS-327
C9	390 10%		DI-390	MD-391	L10T39	CCD-391	MCB245	MS-339
C10	680 10%		DI-680	MD-681	22R5T68	CCS-681	JL-368	MS-368
C11	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C12	.01 400V		P488N-01	D6-103	CUB4S1	4DP-1-103	GEM-411	4TM-S1
C13	.15 200V		P288N-15		CUB2P15	2DP-3-154	GEM-2015	2TM-P15
C14	.15 200V		P288N-15		CUB2P15	2DP-3-154	GEM-2015	2TM-P15
C15	180 10%		1469-00018	D6-181	22R5T18	CM-20B-181K	MCB237	MS-318
C16	.0033 400V 10%		V84C4D33		PM6D33	6DP-1-332	GTM-4233	6TM-D33
C17	.0033 400V 10%		V84C4D33		PM6D33	6DP-1-332	GTM-4233	6TM-D33
C18	470 10%		DI-470	MD-471	22R5T47	CCS-471	JL-347	MS-347
C19	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C20	50000		BPD-05	DF-503	CUB6S5	6DP-3-503	GEM-615	5HK-S50
C21	100 10%		1469-0001	D6-101	22R5T1	CM-20B-101K	MCB235	MS-31
C22	.15 200V		P288N-15		CUB2P15	2DP-3-154	GEM-2015	2TM-P15
C23	.022 400V		P488N-022		CUB4S22	4DP-2-223	GEM-4122	4TM-S22
C24	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C25	2200 10%		DI-2200		PM6D22	CCS-222	JL-222	6TM-D22
C26	.027 400V 10%		P84CM-027		PM6S3	6DP-3-273		4TM-S3
C27	33 10%		1469-000033	D6-330	22R5Q33	CM-20B-330K	CNO-433	MS-433
C28	27 NPO 10%			TCZ-27	C10Q27C	CCTO-270	CNO-427	10TCC-Q27
C29	.068 600V 10%		V84C6S68		PM6S68	6DP-4-683	GTM-6168	6TM-S68
C30	15 NPO 10%		NPO-DI 15	DTZ-15	C10Q15C	CCTO-150	CNO-415	10TCU-Q15
C31	.068 600V 10%		V84C6S68		PM6S68	6DP-4-683	GTM-6168	6TM-S68
C32	68 5%		1469-000068	TCZ-68	22R5Q68	CM-20B-680J	CNO-468	MS-468
C33	.022 400V		P488N-022		CUB4S22	4DP-2-223	GEM-4122	4TM-S22
C34	100 10%		1469-0001	D6-101	22R5T1	CM-20B-101K	MCB235	MS-31
C35	.15 200V		P288N-15		CUB2P15	2DP-3-154	GEM-2015	2TM-P15
C36	.022 400V		P488N-022		CUB4S22	4DP-2-223	GEM-4122	4TM-S22
C37	.15 200V		P288N-15		CUB2P15	2DP-3-154	GEM-2015	2TM-P15
C38	2000 1400V		HVD-15-2000	DD30-202	HVC16D2	16DP-1-202	2HV-222	BL-D20
C39	2000 1400V		HVD-15-2000	DD30-202	HVC16D2	16DP-1-202	2HV-222	BL-D20
C40	1500		BPD-0015	DD-152	BYA10D15	CCD-152	B-215	5HK-D15

CHASSIS—TOP VIEW



SHERWOOD
MODEL S-4000

PARTS LIST AND DESCRIPTIONS (Continued)

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	SHERWOOD PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	300K 50K tap	½	A670J1					Loudness
B	300K 50K tap							Loudness (Record Level)
R2A	500K 200K tap	½	670AB1	BT-65	A47F5-500K	Q19-133X	UT-431	Treble
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
R3A	1meg	½	670AB2	B-69	A47-1meg-S	Q11-137	U54	Bass
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
R4	500K	½	670AB7				TA55A *	Phono Level
R5A	25K	½	A670B8	AB-26	B47-25K-S	B11-120	TA253L	Balance
B	Shaft			AK-1	Not Req.	TM1	Not Req.	

* File shaft end to duplicate original.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R6	56K	
R7	270K	
R8	270K	
R9	150K	
R10	2700Ω	
R11	22meg	
R12	150K	
R13	10meg	
R14	1meg	
R15	220K	
R16	100K	
R17	56K	
R18	470K	
R19	100K	
R20	1meg	
R21	470K	
R22	22K	
R23	470K	
R24	680Ω	
R25	18K	
R26	470K	
R27	33K	
R28	3300Ω	

ITEM No.	RATING	REMARKS
R29	100K	
R30	180K	
R31	470K	
R32	120K	
R33	150K	
R34	2700Ω	
R35	150K	
R36	3300Ω	
R37	1meg	
R38	6800Ω	
R39	82K	
R40	2700Ω	
R41	220K	
R42	1meg	
R43	220K	
R44	1meg	
R45	1200Ω	
R46	680K	
R47	47K 1W	
R48	47K 1W	
R49	150K	
R50	1000Ω	
R51	150K	

ITEM No.	RATING	REMARKS
R52	1000Ω	
R53	12Ω 1W	
R54	47K	
R55	47K	
R56	15K	
R57	68Ω	
R58	150K	
R59	3300Ω	
R60	470K	
R61	1000Ω	
R62	22K	
R63	33K	
R64	1meg	
R65	33Ω 7W	
R66	10K 2W	
R67	15K 1W	
R68	8200Ω	
R69	2200Ω 1W	
R70	33Ω 7W	
R71	15K 1W	
R72	.82Ω 1W	
R73	2700Ω	
R74	10K	

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		SHERWOOD PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	Tone Choke	56-507						140mh

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA						
	PRI.	SEC. 1	SEC. 2	SHERWOOD PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V @ .71A	660VCT @ .060A	52VCT @ .16A	B922J1-1						
	SEC. 3	SEC. 4	SEC. 5							
	6.3VCT @ 3.3A									

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	SHERWOOD PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	7800Ω CT with Screen taps @ 800Ω CT	16Ω taps @ 8Ω, 4Ω	B920J2							

RECTIFIERS

ITEM No.	RATING	REPLACEMENT DATA					NOTES
	CURRENT (Measured)	SHERWOOD PART No.	INTERNATIONAL PART No.	ITT PART No.	SARKES TARZIAN PART No.	SYLVANIA PART No.	
M1	.155A				2S33-2CN1-RV		

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			SHERWOOD PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M2	3AG	1½A 250V			312001 (3AG 1½A 250V)	342001	AGC 1	HKP

MISCELLANEOUS

ITEM No.	PART NAME	SHERWOOD PART No.	NOTES
M3A	Switch		Presence
B	Switch		Scratch Filter
C	Switch		Rumble Filter
M4	Switch		Function Selector
M5	Switch		Tape-Phono-ABC
M6	Switch		Phase (SPDT Slide Type)
M7	Switch		Loudness (DPDT Slide Type)
M8	Switch		Output Tube Balance (SPDT Slide Type)

CABINETS & CABINET PARTS

When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)

PHOTOFACT* Folder

EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

SYLVANIA MODELS 4413, 4422 (Ch. 1-645-1)

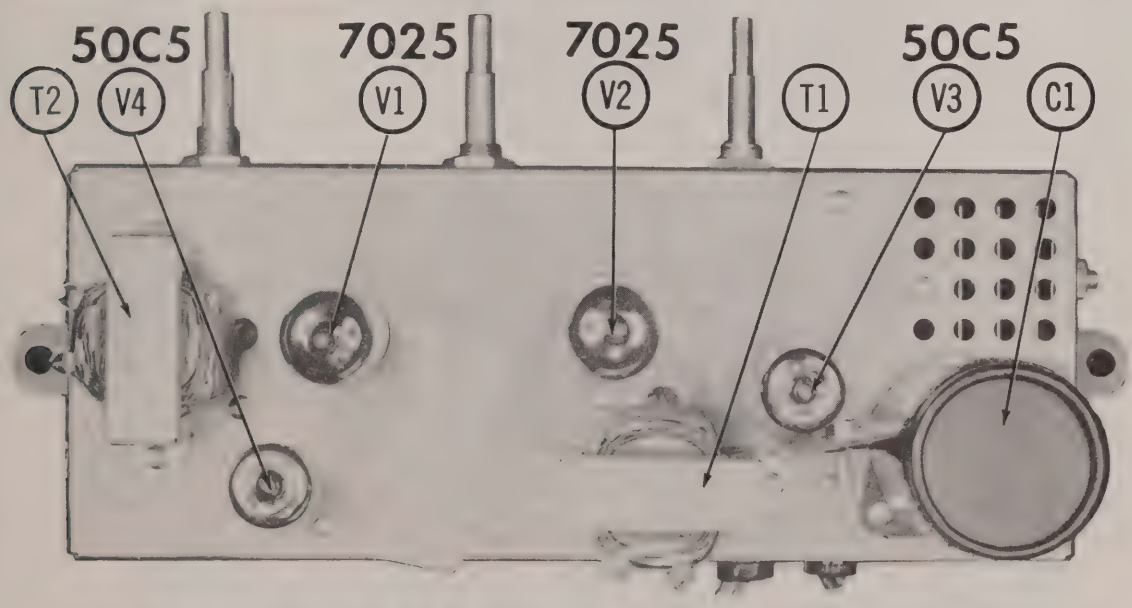
SYLVANIA MODELS 4413,
4422 (Ch. 1-645-1)

MODEL 4413

SYLVANIA MODELS 4413,
4422 (Ch. 1-645-1)

TRADE NAME	Sylvania Models 4413, 4422 (Ch. 1-645-1)
MANUFACTURER	Sylvania Home Electronics, Div. of Sylvania Electric Products, Inc., 700 Ellicott St., Batavia, N. Y.
TYPE SET	AC Operated 4 Tube Stereo Amplifier (Model 4413 is 4 Speed Manual Player; Model 4422 is 4 Speed Automatic Changer)
POWER SUPPLY	110-120 Volts AC, 60 Cycles RATING 32 Watts, .36 Amp. @117 Volts AC (Less Motor)

FOR SERVICE INFORMATION ON RECORD CHANGER — SEE SYLVANIA 1-318-3 — PHOTOFACT SET 401 FOLDER 13

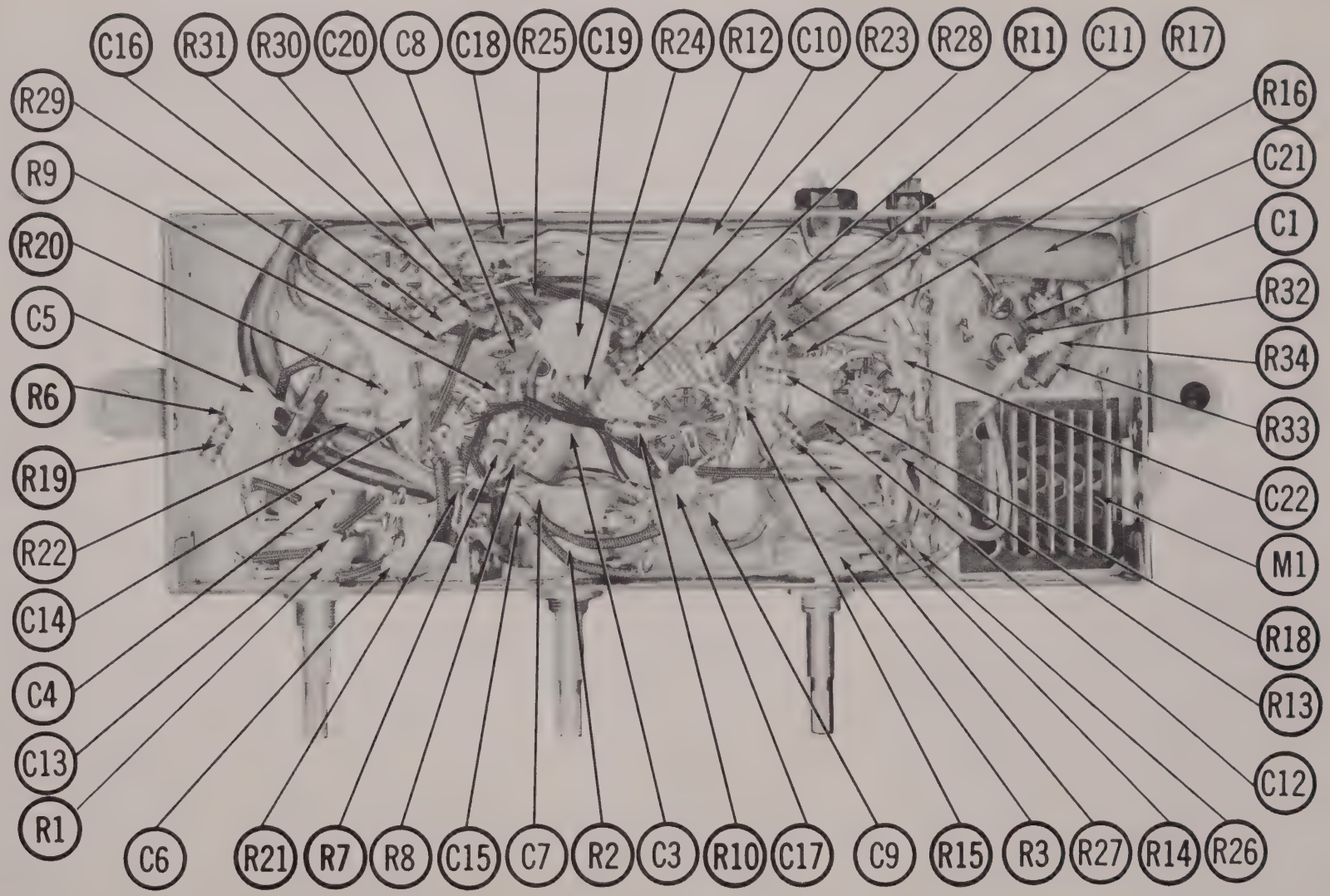


HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

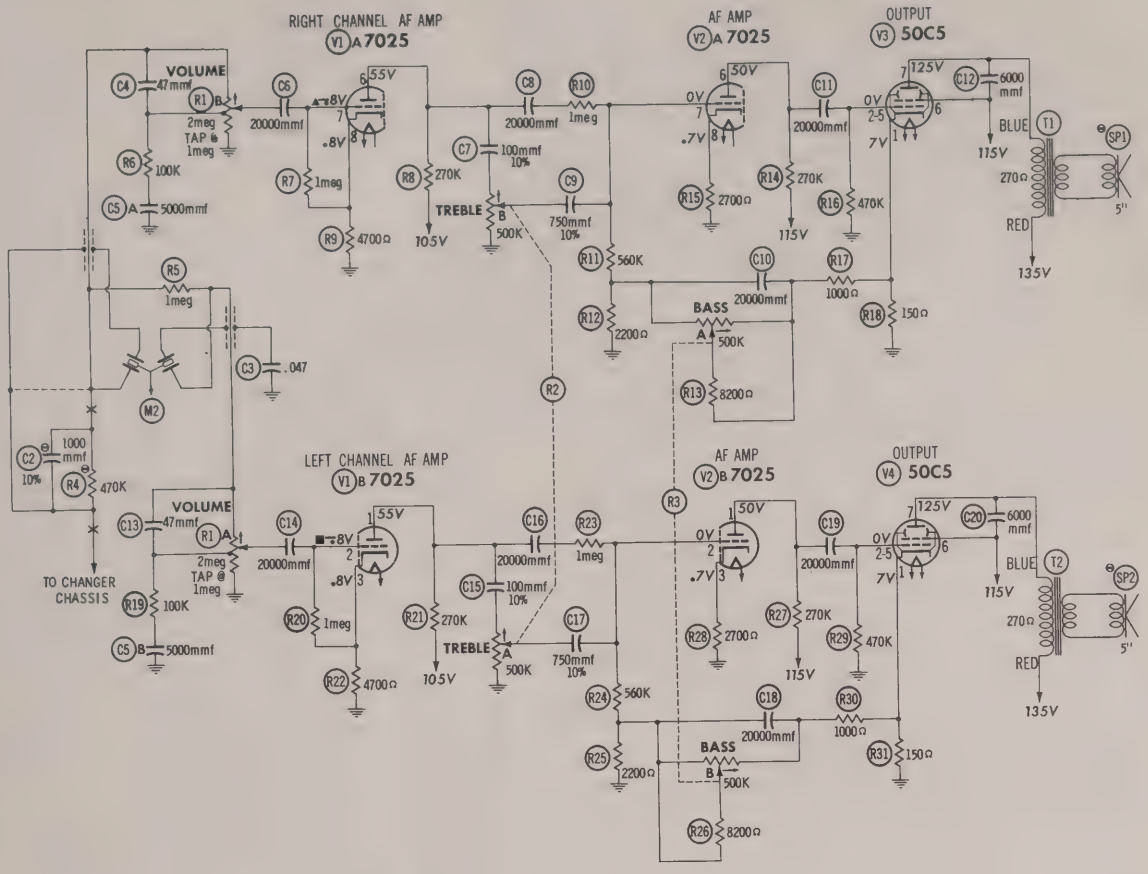
The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1960 Howard W. Sams & Co., Inc., Indianapolis 6, Indiana. Printed in U.S. of America

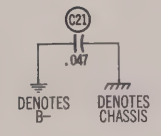
JT305

SET 470 FOLDER 20



CHASSIS - BOTTOM VIEW



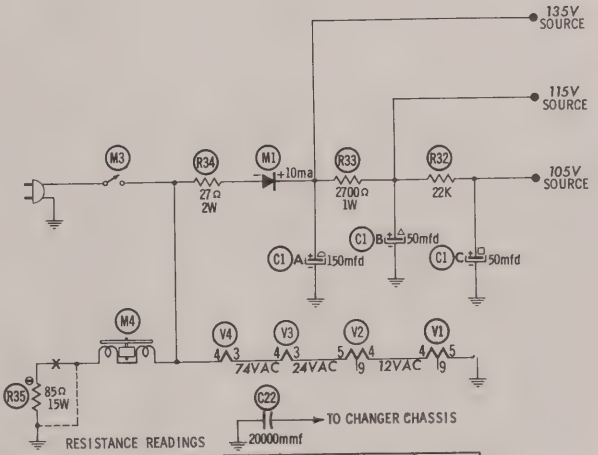


1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

Θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	7025	†290K	1meg	4700Ω	12Ω	0Ω	†290K	1meg	4700Ω	6Ω
V2	7025	†270K	560K	2700Ω	12Ω	24Ω	†270K	560K	2700Ω	18Ω
V3	50C5	150Ω	470K	24Ω	75Ω	470K	†2700Ω	†270Ω		
V4	50C5	150Ω	470K	75Ω	125Ω	470K	†2700Ω	†270Ω		

† MEASURED FROM OUTPUT OF M1
■ MEASURED FROM PIN 3 OF V1
▲ MEASURED FROM PIN 8 OF V1

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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SYLVANIA MODELS 4413, 4422 (Ch. 1-645-1)

PARTS LIST AND DESCRIPTIONS

WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord	Use BELDEN No. 1765-B (6 Ft. Length) 1725-K (7½ Ft. Length)
Low-Loss Shielded Lead (Interconnecting)	Use BELDEN No. 8401
Phono Pick-up Arm Cable	Use BELDEN No. 8430 (Two Conductor - Twisted)

TUBES

◆ CBS ◆ GENERAL ELECTRIC ◆ RAYTHEON ◆ SYLVANIA ◆

ITEM No.	USE	TYPE
V1	Right Channel AF Amp. Left Channel AF Amp.	7025
V2	Right Channel AF Amp. Left Channel AF Amp.	7025
V3	Right Channel Output	50C5
V4	Left Channel Output	50C5

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA SYLVANIA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	▬150	150	161-3037			FP240		TVLS-3449.1*	
B	▲50	150				TC495			
C	■50	150							

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C2	1000 10%	①	DI-1000			CCS-102	JL-210	5GA-D1S 10%*
C3	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C4	47		SI 47	D6-470	L10Q47	CCD-470	UC5447	5GA-Q47
C5A	5000		BPD2-2X0047	DD2-502	BYC6DD5	CCD-502	B-250	5HK-2D47
B	5000					CCD-502	B-250	
C6	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S2
C7	100 10%		DI-100	DD-101	L10T1	CCD-101	CNO-310	5GA-T1S 10%*
C8	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S2
C9	750 10%		DI-750			CCS-751		5GA-T75S 10%*
C10	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S2
C11	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S2
C12	6000		DI-5600	DD-562	HVE16D6	6DP-1-602	B-260	20HK-D6
C13	47		SI 47	D6-470	L10Q47	CCD-470	CNO-447	5GA-Q47
C14	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S2
C15	100 10%		DI-100	DD-101	L10T2	CCD-101	CNO-310	5GA-T1S 10%*
C16	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S2
C17	750 10%		DI-750			CCS-751		5GA-T75S 10%*
C18	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S2
C19	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S2
C20	6000		DI-5600	DD-562	HVE16D6	6DP-1-602	B-260	20HK-D6
C21	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C22	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S2

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

① Not used in Model 4422

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA SYLVANIA PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	2meg *	½	153-0181				UEL748	Volume, Left Channel
B	2meg *	½						Volume, Right Channel
R2A	500K	½	153-0182	AB-60	AD47-500K-Z	Q13-133		Treble, Left Channel
B	500K	½		SR-60	Not Req.	M13-133		Treble, Right Channel
C	Shaft			AK-8	RS-3/16	NQ		
R3A	500K	½	153-0182	AB-60	AD47-500K-Z	Q13-133		Bass, Right Channel
B	500K	½		SR-60	Not Req.	M13-133		Bass, Left Channel
C	Shaft			AK-8	RS-3/16	NQ		

* Tap ⓐ 1meg.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R4	470K	Note 1
R5	1meg	
R6	100K	
R7	1meg	
R8	270K	
R9	4700Ω	
R10	1meg	
R11	560K	
R12	2200Ω	
R13	8200Ω	
R14	270K	
R15	2700Ω	
R16	470K	
R17	1000Ω	
R18	150Ω	
R19	100K	
R20	1meg	
R21	270K	
R22	4700Ω	
R23	1meg	
R24	560K	
R25	2200Ω	
R26	8200Ω	
R27	270K	
R28	2700Ω	
R29	470K	
R30	1000Ω	
R31	150Ω	
R32	22K	
R33	2700Ω 1W	
R34	27Ω 2W	(187-0062)
R35	85Ω 15W	Note 1

Note 1. Not used in Model 4422.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA SYLVANIA PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T1	2700Ω	6-8Ω	143-0074	22S86	A-2902①	AU-604①	A-3849①	22S86		① Drill New Mounting Hole
T2	2700Ω	6-8Ω	143-0074	22S86	A-2902①	AU-604①	A-3849①	22S86		

SPEAKER

ITEM No.	TYPE SIZE	TYPE FIELD	TYPE V. C. IMP.	REPLACEMENT DATA SYLVANIA PART No.	REPLACEMENT DATA QUAM PART No.	NOTES
SP1	5"	PM	6-8Ω	539-0526①	52A1Z6.8	① Model 4413
SP2	5"	PM	6-8Ω	539-0526①	52A1Z6.8	② Model 4422
	6"	PM	6-8Ω	539-0610②		
	6"	PM	6-8Ω	539-0610②		

RECTIFIERS

ITEM No.	RATING CURRENT (Measured)	REPLACEMENT DATA SYLVANIA PART No.	INTERNATIONAL PART No.	ITT PART No.	SARKES TARZIAN PART No.	SYLVANIA PART No.	NOTES
M1	.011A	517-0020 ①	T065 ①	1235AH ①	150 ①		① Selenium Type

PHONO CARTRIDGE

ITEM No.	SYLVANIA PART No.	ASTATIC PART No. CARTRIDGE	ASTATIC PART No. NEEDLE	ELECTRO-VOICE PART No. CARTRIDGE	ELECTRO-VOICE PART No. NEEDLE	JENSEN PART No. CARTRIDGE	JENSEN PART No. NEEDLE	SONOTONE PART No. CARTRIDGE	SONOTONE PART No. NEEDLE
M2		① 13TB	Not Req.	② 66	Not Req.			① 10T	Not Req.

① Includes mount.
② Use mount PT-3

MISCELLANEOUS

ITEM No.	PART NAME	SYLVANIA PART No.	NOTES
M3	Switch	571-0027	Off-On Model 4413 (Part of Changer Model 4422)
M4	Motor	924-0011	Drive, 4 Speed Manual

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	740-0257	Volume (Outer)
Knob	740-0258	Volume (Inner)
Knob	740-0010	Bass, Treble
Knob	740-0256	Off-On

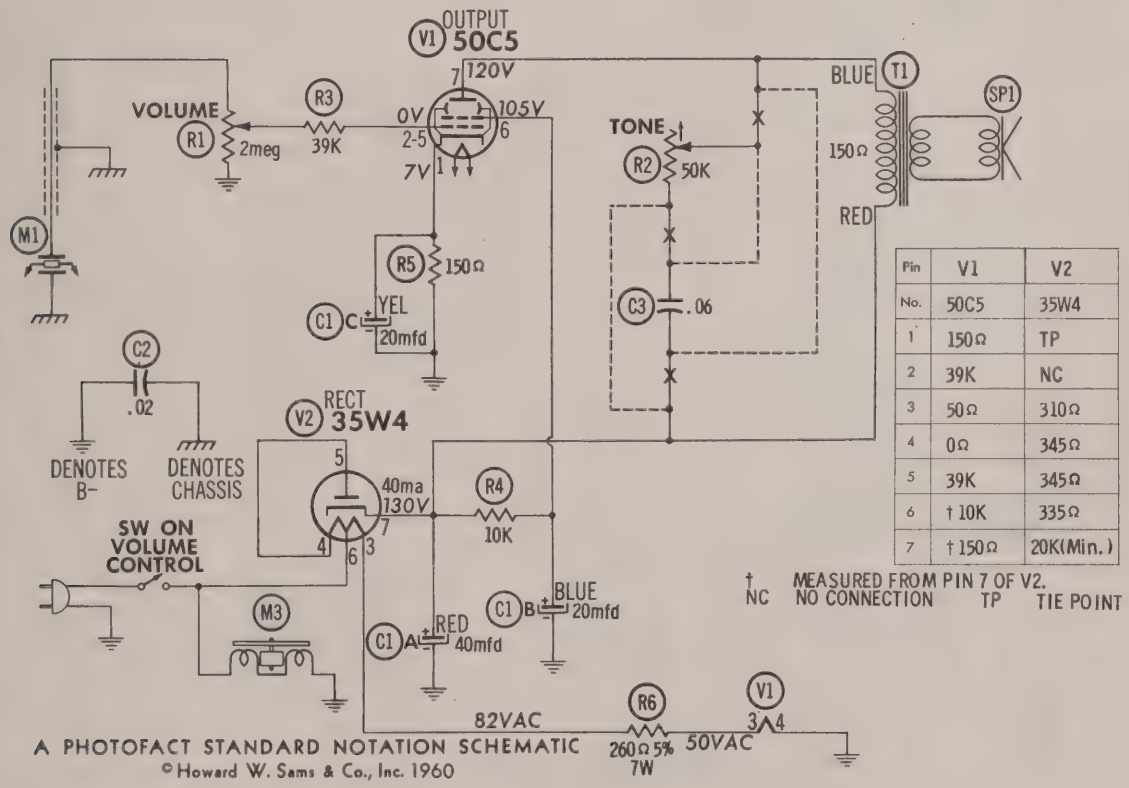
PHOTOFACT® Folder

ZENITH MODELS
BP6B, L, V

ZENITH MODELS
BP6B, L, V

MODEL BP6B

TRADE NAME	Zenith Models BP6B, BP6L, BP6V
MANUFACTURER	Zenith Radio Corp., 6001 Dickens Ave., Chicago 39, Illinois
TYPE SET	AC Operated 2 Tube Phono Amplifier With 4 Speed Manual Record Player
POWER SUPPLY	110-120 Volts AC, 60 Cycles RATING 25 Watts, .27 Amp. @ 117 Volts AC (Less Motor)



Pin No.	V1	V2
1	150Ω	TP
2	39K	NC
3	50Ω	310Ω
4	0Ω	345Ω
5	39K	345Ω
6	†10K	335Ω
7	†150Ω	20K(Min.)

† MEASURED FROM PIN 7 OF V2.
NC NO CONNECTION TP TIE POINT

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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ZENITH MODELS
BP6B, L, V

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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JR372

SET 470 FOLDER 21

PARTS LIST AND DESCRIPTIONS

TUBES

♦ CBS ♦ GENERAL ELECTRIC ♦ RAYTHEON ♦ SYLVANIA ♦					
ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	Output	50C5	V2	Rectifier	35W4

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	ZENITH PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	40	150	WC-12144	PRS4400	BBRT4215C	TCT3114	TDLT-12	TVA-3423	
B	20	150							
C	20	25							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C2	.02 200V		P288N-02	DD-203	CUB2S2	4DP-2-203	GEM-412	2TM-S2
C3	.06 200V		P288N-06		CUB6S6	6DP-4-603	GEM-616	6TM-S6

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	ZENITH PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	2meg	½	WC11748	B-76	A47-2meg-Z	Q13-139	TA54A	Volume
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	
C	Switch			KR-1	SWE-12	76-1	US-26	Off-On
R2A	50K	½	WC11749	B-32	A47-50K-Z	Q13-123	TA26A	Tone
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R3	39K	
R4	10K	

ITEM No.	RATING	REMARKS
R5	150Ω	

ITEM No.	RATING	REMARKS
R6	260Ω 5% 7W	

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	ZENITH PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	2000Ω	3-4Ω	(Part of SP1)	26S58	A-3025	AU-605	A-3332	26S58	S-12X	

SPEAKER

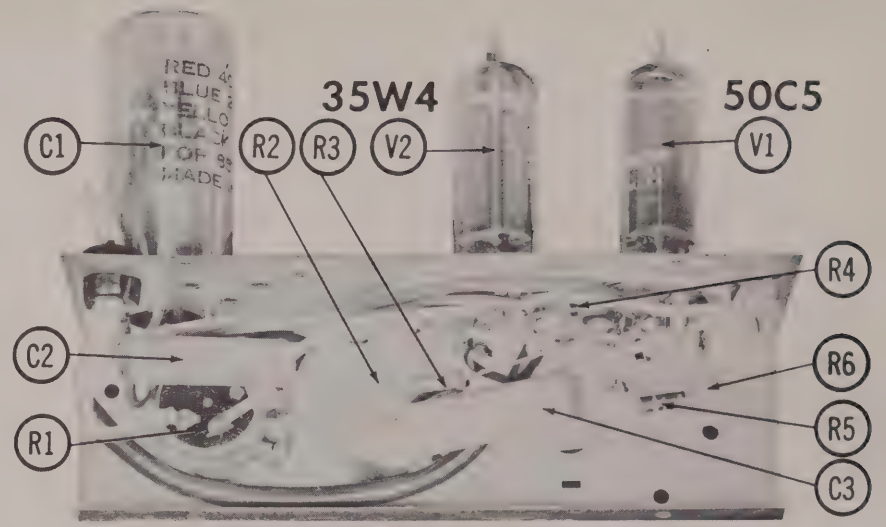
ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	ZENITH PART No.	QUAM PART No.	
SP1	4"	PM	3-4Ω	WC11752 ①	4A07	① Includes T1.

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA								
	ZENITH PART No.	ASTATIC PART No.		ELECTRO-VOICE PART No.		JENSEN PART No.		SONOTONE PART No.	
		CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE
M1	142-95	314TS	N8-1 & N8-3						

ASTATIC NEEDLE LISTING SHOWN ABOVE IS SPECIFIED FOR THE REPLACEMENT CARTRIDGE LISTED. FOR ORIGINAL CARTRIDGE NEEDLE REPLACEMENTS SEE BELOW.

CHASSIS—TOP VIEW



PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA			REMARKS
	ZENITH PART No.	CLEVITE WALCO PART No.	JENSEN PART No.	
M2	56-372 (LP) †	W-64S †	CRA-55 † or	† Jewel ♦ Diamond
	56-371 (STD) †	W-64D ♦	CRA-55D ♦	
		W-64MGS †	CRA-55LP † or	
		W-64MGD	CRA-55LPD ♦	

MISCELLANEOUS

ITEM No.	PART NAME	ZENITH PART No.	NOTES
M3	Motor	WC13185	(G. I.) (Stamped G on Motorboard)
	Motor	WC13189	(All.) (Stamped A on Motorboard)

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	WC121262E	Two used, Model BP6V
Knob	WC121263E	Two used, Model BP6L
Knob	WC121269E	Two used, Model BP6B
Cabinet	WC13115	Includes Hardware, Model BP6L
Cabinet	WC13116	Includes Hardware, Model BP6B
Cabinet	WC13117	Includes Hardware, Model BP6V
Handle	WC130568B	

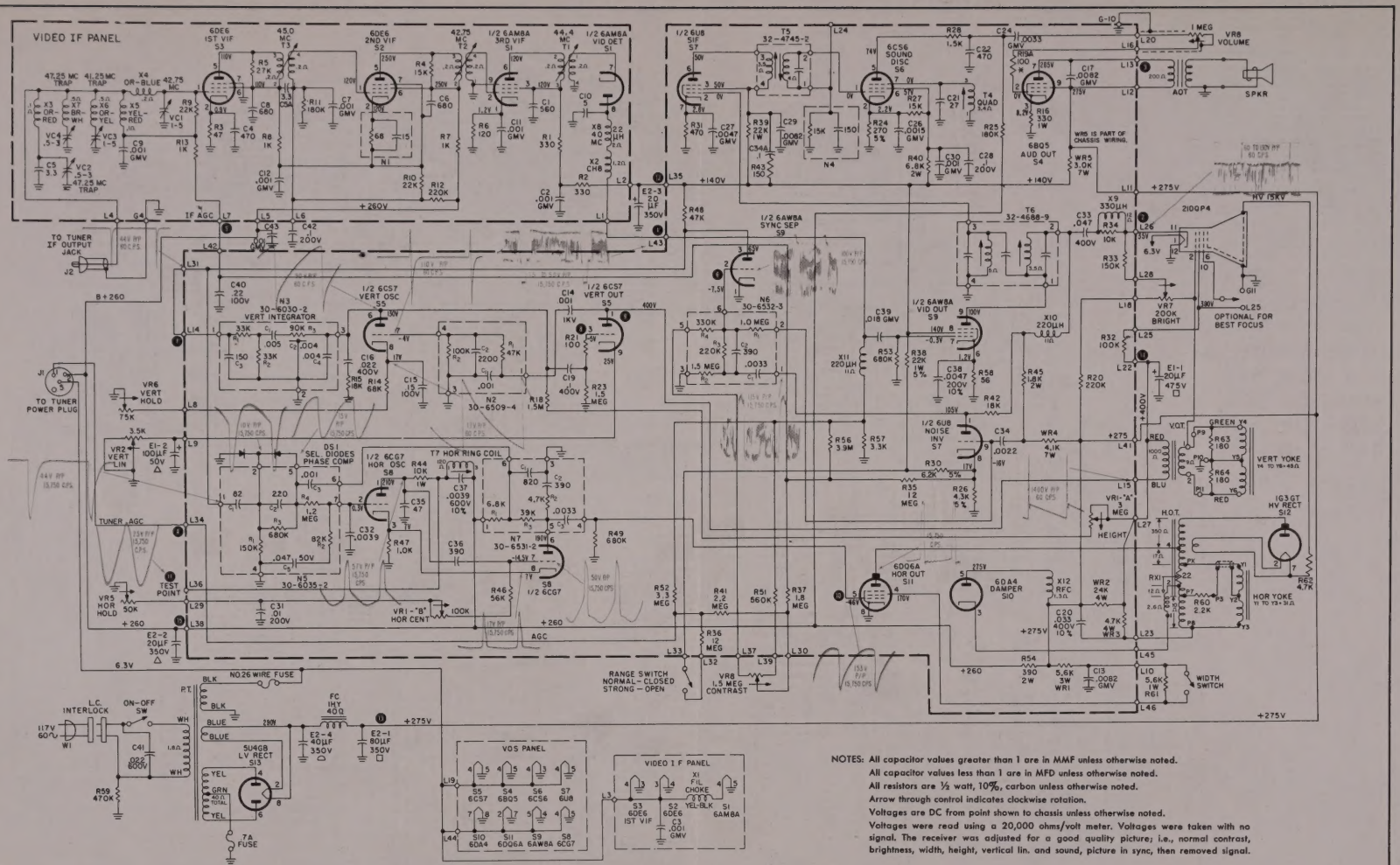
WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)

Low-Loss Shielded Lead (Interconnecting) ..... Use BELDEN No. 8401

Phono Pick-up Arm Cable ..... Use BELDEN No. 8430 (Two Conductor - Twisted)



NOTES: All capacitor values greater than 1 are in MMF unless otherwise noted.
All capacitor values less than 1 are in MFD unless otherwise noted.
All resistors are ½ watt, 10%, carbon unless otherwise noted.
Arrow through control indicates clockwise rotation.
Voltages are DC from point shown to chassis unless otherwise noted.
Voltages were read using a 20,000 ohms/volt meter. Voltages taken with no signal. The receiver was adjusted for a good quality picture; i.e., normal contrast, brightness, width, height, vertical lin. and sound, picture in sync, then removed signal.

PHILCO MODELS H4248E, H4250E, L, H4253, L, H4668, L, LR, R, H4670, L, W, H4672, L, W, H4673LR, MR, R, UH4248E, UH4250, E, L, UH4253, L, UH4668, L, LR, R, UH4670, L, W, UH4672, L, W, UH4673LR, MR, R (CH. 10L31, U, 10L32, U)

Schematic Diagram Courtesy of Philco Corporation

← PHILCO

SYLVANIA ↓

READ THESE INSTRUCTIONS CAREFULLY AND OBSERVE THE CONDITIONS NOTED WHEN TAKING VOLTAGE READINGS OR OBSERVING WAVEFORMS.

VOLTAGE MEASUREMENT CONDITIONS UNLESS OTHERWISE SPECIFIED

1. Voltages measured to chassis using VTVM.
2. AC power source 117V. 60 cycle line.
3. Voltage readings in brackets taken with no signal input; channel selector set to a free channel, antenna disconnected. Antenna terminals shorted together and grounded to chassis.
4. Voltage readings not in brackets taken with a strong signal input; tuner set to strong local station developing approximately 8 volts on 1F AGC Bus test point Ⓐ. (junction of R208 and C208).
5. Contrast control set to maximum. Brightness control set to minimum.
6. Voltage values shown are average readings. Variations may be observed due to normal production tolerances.

SPECIAL VOLTAGE MEASUREMENT CONDITIONS

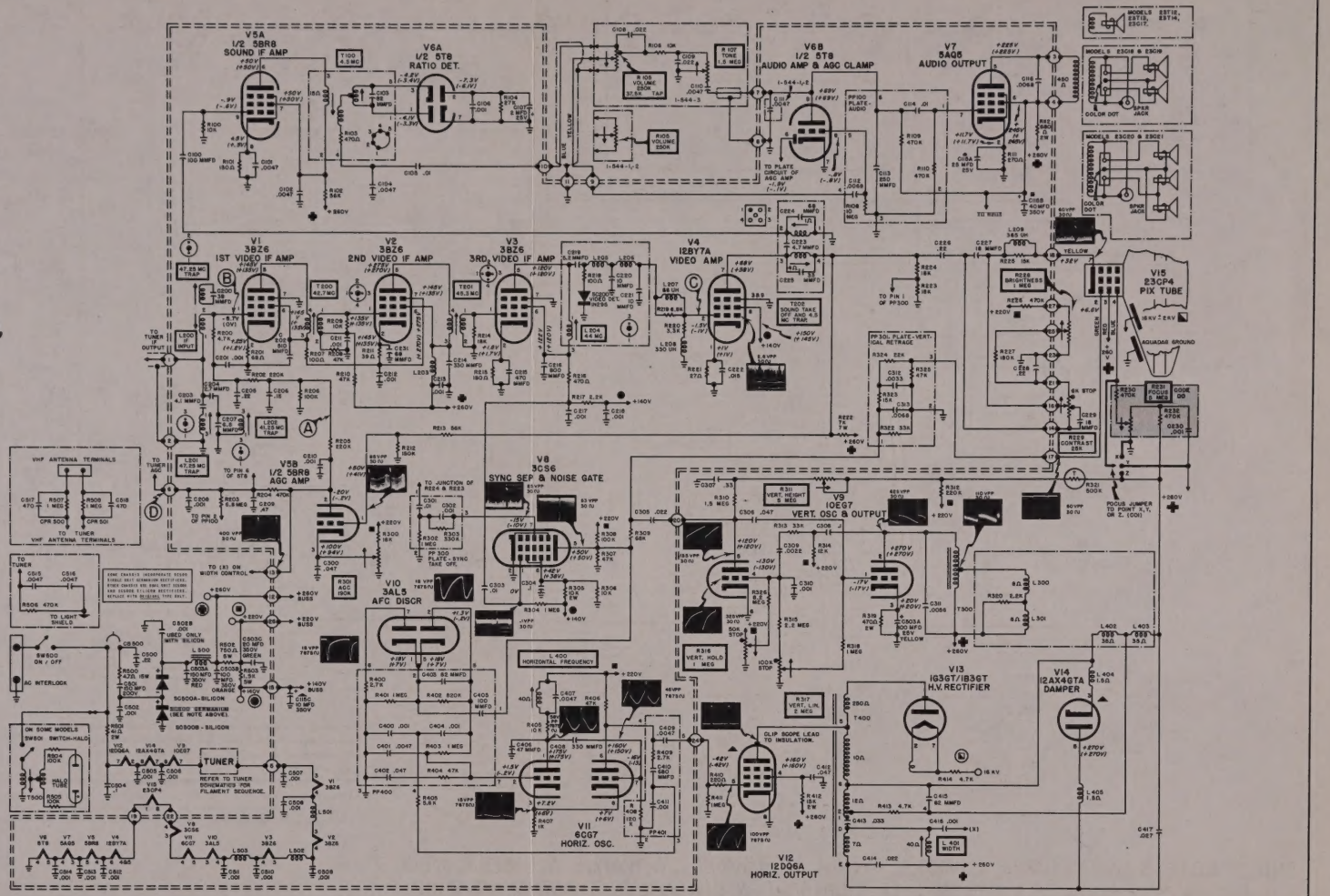
Ⓢ Picture tube anode voltage measured with VTVM high voltage probe at line voltage of 117 volts under conditions of normal signal. No brightness and correct scan size.

▲ High peak voltage of short duration may damage meter used for this measurement.

WAVEFORM MEASUREMENT CONDITIONS

1. Channel selector set to strong channel.
2. Contrast control set for signal of 40 volt peak to peak at yellow lead of picture tube.
3. Waveforms measured with respect to chassis using Sylvania type 10X oscilloscope. (other type oscilloscopes may alter waveform shapes or amplitudes.)
4. The terms "300" or "7875A" refer to scope sweep frequency used.

SYLVANIA MODELS 23C17, 23C18, 23C19, 23C20, 23C21, 23T12, 23T13, 23T14 (CH. 1-544-1, -2, -3)


V5A 1/2 5BR8 SOUND IF AMP
V6A 1/2 5T8 RATIO DET.
V6B 1/2 5T8 AUDIO AMP & AGC CLAMP
V7 5AQ5 AUDIO OUTPUT
V1 3BZ6 1ST VIDEO IF AMP
V2 3BZ6 2ND VIDEO IF AMP
V3 3BZ6 3RD VIDEO IF AMP
V4 12BY7A VIDEO AMP
V5B 1/2 5BR8 AGC AMP
V8 3CS6 SYNC SEP & NOISE GATE
V9 10EG7 VERT. OSC & OUTPUT
V10 3AL5 AFC DISCR
V11 6GG7 HORIZ. OSC.
V12 12DQ6A HORIZ. OUTPUT
V13 1G3GT/1B3GT H.V. RECTIFIER
V14 12AX4GTA DAMPER
V15 23CP4 PIX TUBE
TUNER
REFER TO TUNER SCHEMATICS FOR FILAMENT SEQUENCE.

Schematic Diagram Courtesy of Sylvania Electric Products Inc.

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